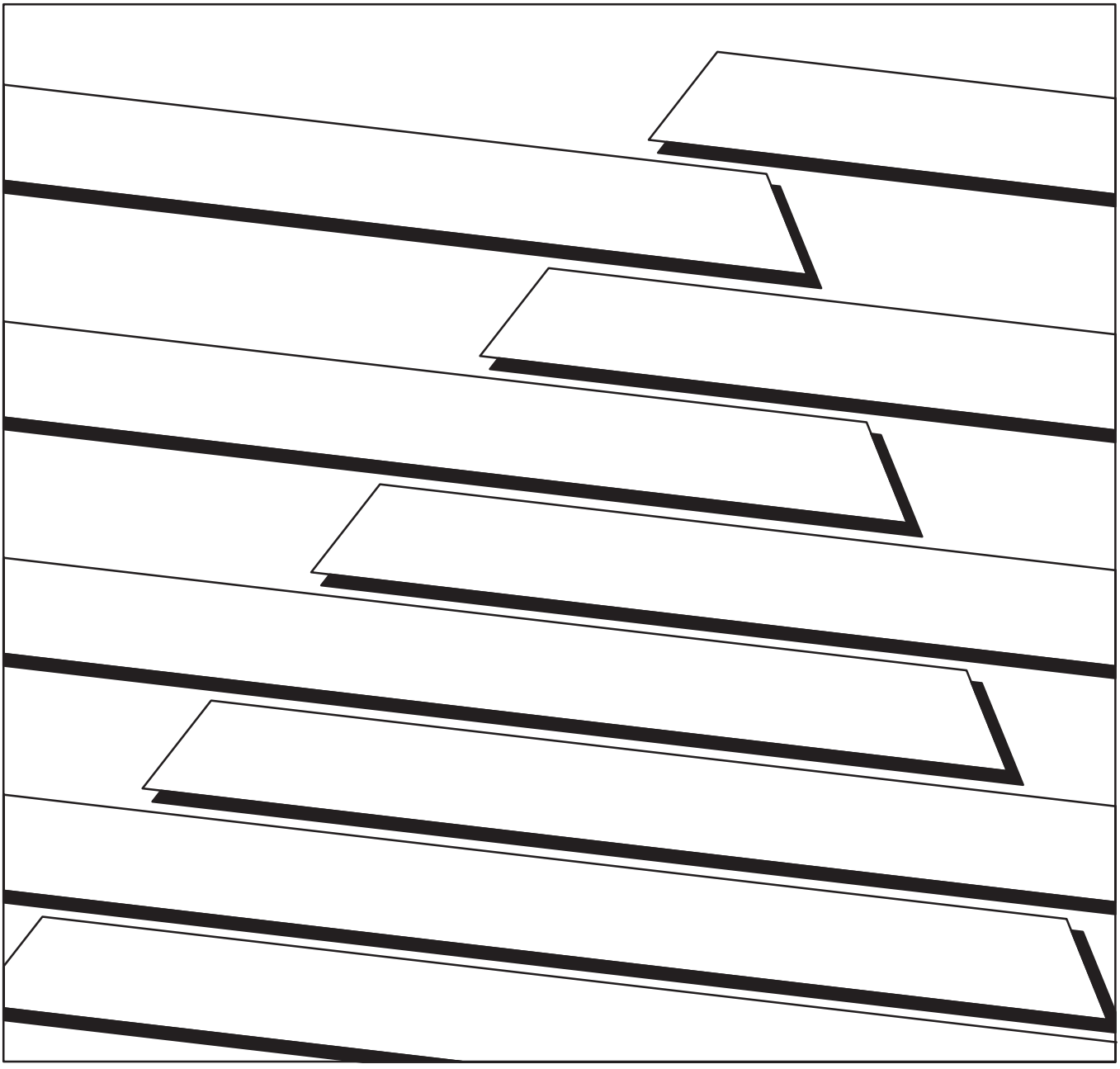
Rockwell Automation
Allen-Bradley

Block I/O
Cat. No. 1791-IOBX and -IOVX

User Manual



Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI–1.1, “Safety Guidelines For The Application, Installation and Maintenance of Solid State Control” (available from your local Allen-Bradley office) describes some important differences between solid-state equipment and electromechanical devices which should be taken into consideration when applying products such as those described in this publication.

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Throughout this manual we make notes to alert you to possible injury to people or damage to equipment under specific circumstances.

ATTENTION: Tells readers where people may be hurt if procedures are not followed properly.

ATTENTION: Tells readers where machinery may be damaged or economic loss can occur if procedures are not followed properly.

Attention helps you:

- Identify a hazard.
- Avoid the hazard.
- Recognize the consequences.

Important: We recommend you frequently backup your application programs on appropriate storage medium to avoid possible data loss.

Using This Manual

Purpose of Manual

This manual shows you how to use your Block I/O with an Allen-Bradley programmable controller. It helps you:

- install
- program and
- troubleshoot your module.

Audience

You must be able to program and operate an Allen-Bradley programmable controller (PLC) to make efficient use of Block I/O modules.

We assume that you know how to do this in this manual. If you do not, refer to the appropriate PLC programming and operations manual before you attempt to program this module.

Vocabulary

In this manual, we refer to:

- the block I/O module as the “block” or the “module”
- the programmable controller as the “controller” or “processor.”

Manual Organization

This manual is divided into 4 chapters. The following chart shows each chapter with its corresponding title and brief overview of the topics covered in that chapter.

Chapter	Title	Topics Covered
1	Introducing Block I/O	Description of the module, including general and hardware features
2	Installing the Module	Module power requirements, location, and wiring information
3	Configuring your block I/O	How to set the configuration switches and address the block I/O.
4	Troubleshooting	How to use the indicators to troubleshoot your block I/O module. How to replace the fuse.
Appendix A	Specifications	Specifications for the block I/O.

About Block I/O

Block I/O consists of small, self–contained remote I/O devices complete with power supply, programmable controller interface, input/output connections and signal conditioning circuitry.

This publication covers the 1791–IOBX and –IOVX block I/O modules. The 1791–IOBX has 64 sinking inputs and 64 sourcing outputs; the 1791–IOVX has 64 sourcing inputs and 64 sinking outputs. In all other aspects, they are identical.

Related Publications

For a list of publications with information on Allen-Bradley programmable controller products, consult our publication index (SD499).

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Chapter 1

Introducing Block I/O

Chapter Objectives

In this chapter you will learn what block I/O is, its features, and how it functions.

General Description

Block I/O consists of small, self-contained remote I/O devices complete with power supply, programmable controller interface, input/output connections and signal conditioning circuitry.

The 1791-IOBX 24V dc module has 64 sink input channels, and 64 source output channels.

The 1791-IOVX 24V dc module has 64 source input channels, and 64 sink output channels.

Complete specifications for these modules are contained in Appendix A.

The blocks are compatible with PLC-2®, PLC-3®, and PLC-5® family programmable controllers, and the SLC® 500 modular controllers. When used with PLC-2 family programmable controllers, a sub-scanner module is used to communicate with the blocks. When used with PLC-3 and PLC-5 family programmable controllers, they can be connected directly to the controller or to a scanner module. When used with SLC 500 controllers, a 1747-SN remote I/O scanner is used to communicate with the blocks.

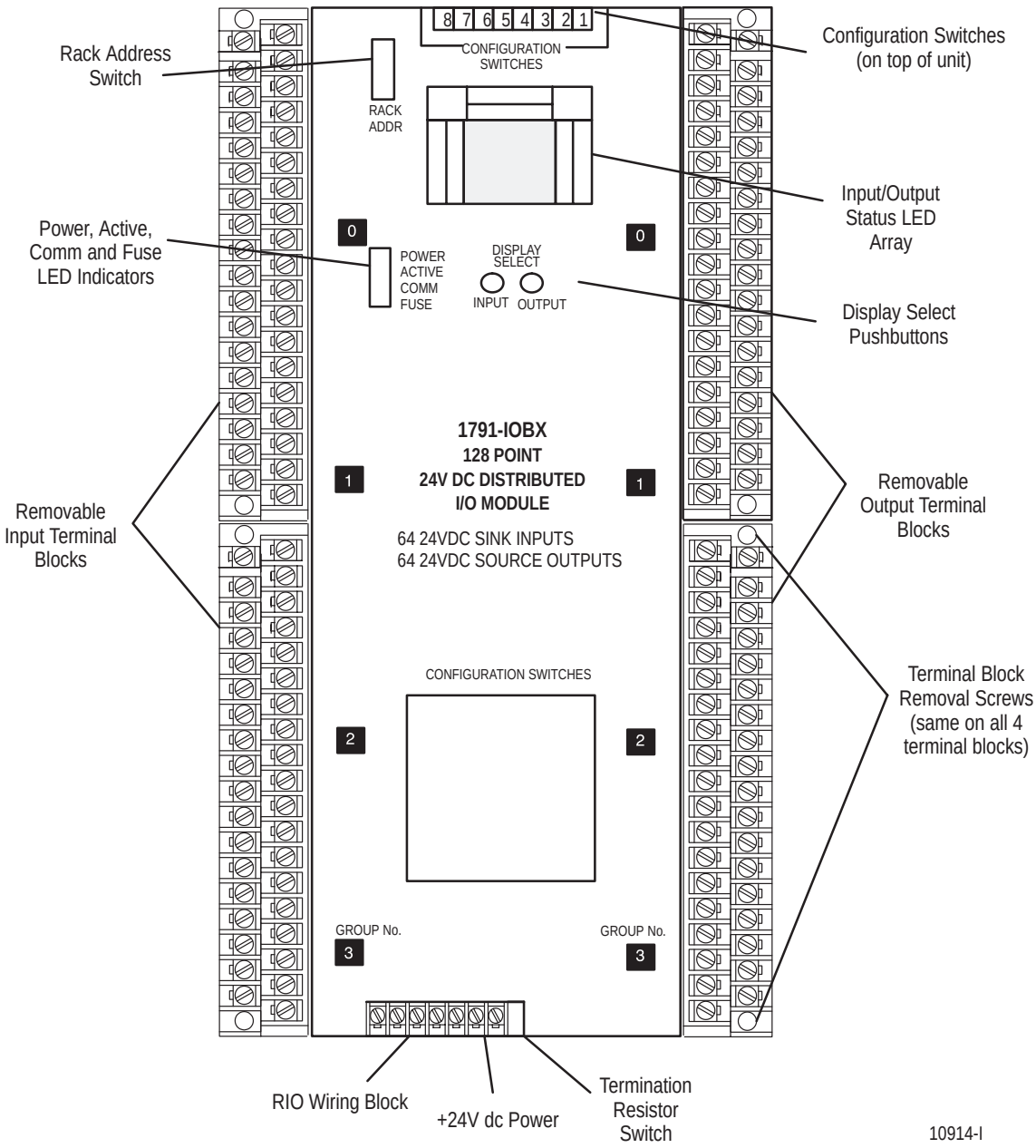
ATTENTION: When using PLC-3 programmable controllers, you must use a 1775-S5 or -SR5 scanner module. **Do not use** 1775-SR, -S4A or -S4B scanner modules.

Note: The 1791-IOBX and -IOVX block modules are not compatible with the 1747-DSN scanner module.

Connections are made to removable terminal blocks mounted on the sides of the block.

Physical features of the block I/O are shown in Figure 1.1.

Figure 1.1
Major Features of the 1791-IOBX and -IOVX Block I/O Modules (-IOBX shown)



Wiring Terminals - The remote I/O field wiring is made to 4 separate removable 37-pin terminal blocks mounted on the sides of the module. Terminal assignments are shown in chapter 3.

A separate nonremovable terminal block is provided for connection of the remote I/O link and external 24V dc power supply.

Switch Assemblies - Two DIP switches are provided for setting the I/O configuration and rack address.

The **configuration switch** lets you select baud rate, last state, processor restart lockout, last rack and I/O group.

The **rack address switch** lets you select the system rack address for the block.

A third switch is provided for selection of the termination resistor.

Status Indicators - Indicators are provided for power, active, communication and fuse blown indications. An LED array provides input/output status.

Status Indicators - Bi-color LED indicators provide power, active, communication and fuse blown indications. An LED array provides input/output status.

Indicator	Indication	
Power (green/wht)	On (green)	Customer voltage is present
	Off (wht)	No customer voltage (less than 2V)
Active (green/red)	On (green)	CPU operating correctly
	Off (red)	CPU not running
Comm (green/wht)	On (green)	Communication correctly established
	Off (wht)	Communication not established
Fuse (red/wht)	On (red)	One of the 4 output fuses is open
	Off (wht)	All fuses are intact

The I/O status array is an 8 by 8 array of 64 LEDs capable of displaying the status of 32 inputs and 32 outputs at any one time. Pushbuttons are provided to toggle the display between the lower 32 bits and the upper 32 bits.

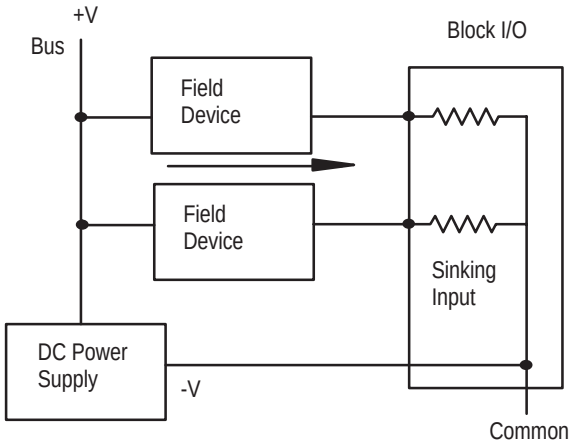
How the Block I/O Fits in a PLC System

Block I/O is a complete I/O interface that includes the functionality of the I/O rack, adapter, power supply, and I/O modules in a single unit. Simply connect sensors and actuators to the module and use the remote I/O cable to connect the block I/O to your programmable controller (Figure 1.6).

The 1791-IOBX block uses sinking inputs and sourcing outputs.

In sinking inputs, the dc common is bussed on the block. and the current is sourced from the field device. The sourcing field device switches the hot side of the power supply bus causing current to flow through the sourcing device to the sinking input on the block. Refer to Figure 1.2.

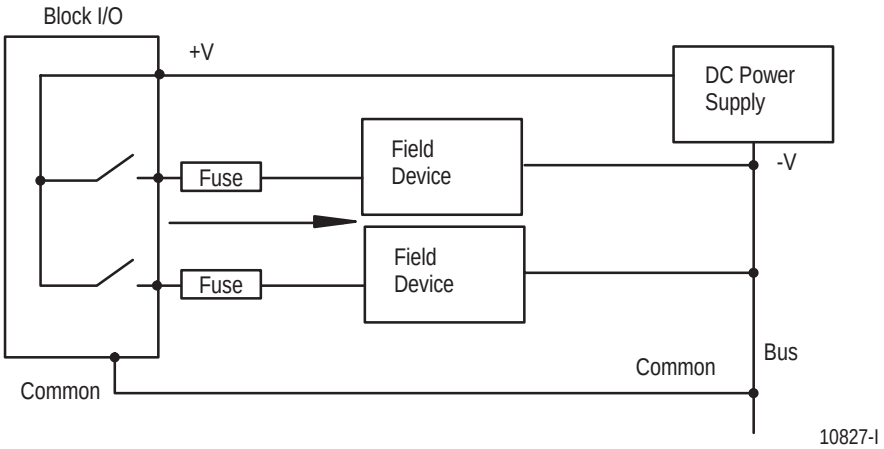
Figure 1.2
Sinking Input Example



Sourcing outputs have the power bussed in the block. When the output is on, current is supplied to the field control device, which sinks the current. The field circuit and the equipment remain at ground potential until the output is turned on. Refer to Figure 1.3.

Note: The outputs must be externally fused to protect the device output against overcurrent or short circuit conditions.

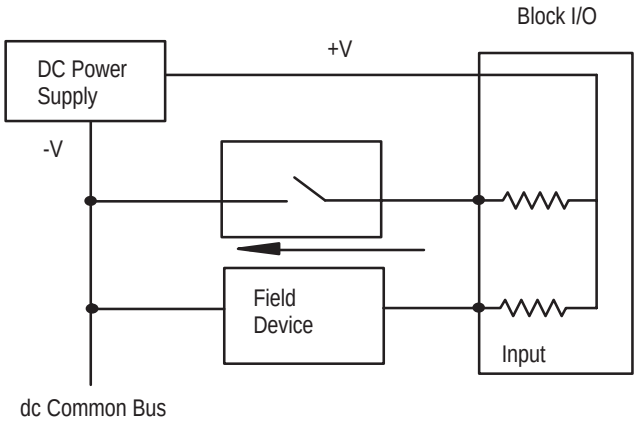
Figure 1.3
Sourcing Output Example



The 1791-IOVX block uses sourcing inputs and sinking outputs.

In sourcing input modules (Figure 1.4), the +V on dc circuits is bussed on the module supplying (sourcing) the current for each input circuit. The field device switches the circuit to the common (side of the power supply, sinking the circuit and causing current to flow from the module's input.

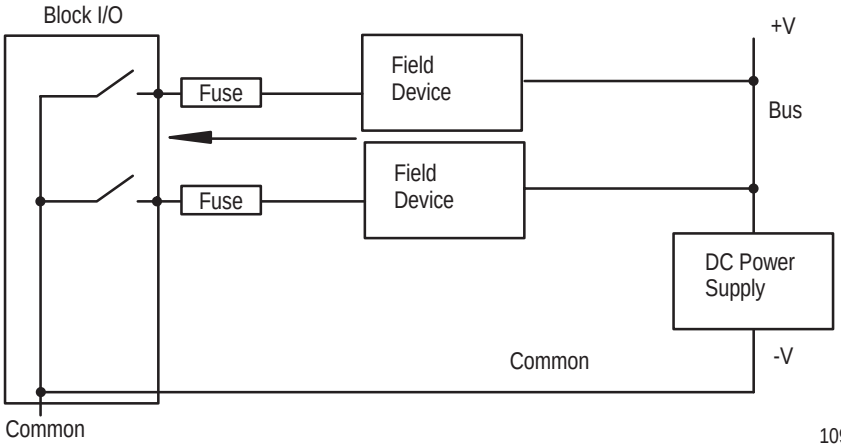
Figure 1.4
Sourcing Input Example



In sinking outputs (Figure 1.5), the current flow is reversed. The dc common is bussed on the module and the current is sourced from the field device being actuated. When an output is turned on, the output switch in the module sinks the circuit, causing current to flow from the +V bus through the field device to the module.

Note: The outputs must be externally fused to protect the device output against overcurrent or short circuit conditions.

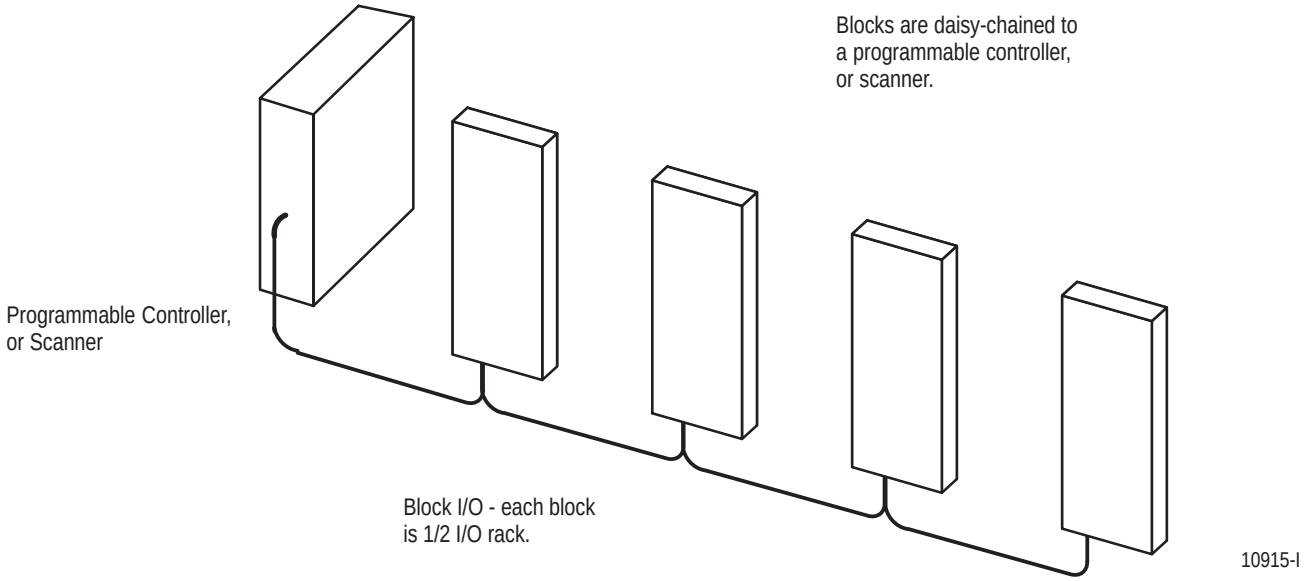
Figure 1.5
Sinking Output Example



Block I/O functions exactly like any Allen-Bradley remote I/O product. Input and output data is scanned asynchronously and transferred back and forth between the block and the controller input and output image table.

You connect the block I/O to your remote I/O link as you would any other device. The block looks like a 1/2 I/O rack to the processor, and uses 4 words of input image table memory and 4 words of output image table memory. The block is addressed directly on the remote I/O link.

Figure 1.6
Block I/O Connection in a PLC System



Summary

In this chapter you learned what block I/O is, its features and how it functions.

Chapter 2

Installing Block I/O

Chapter Objectives

In this chapter you will learn how to mount the block, how to connect the remote I/O link, how to connect the input and output wiring to the block, and how to terminate the remote I/O link.

Pre-installation Considerations

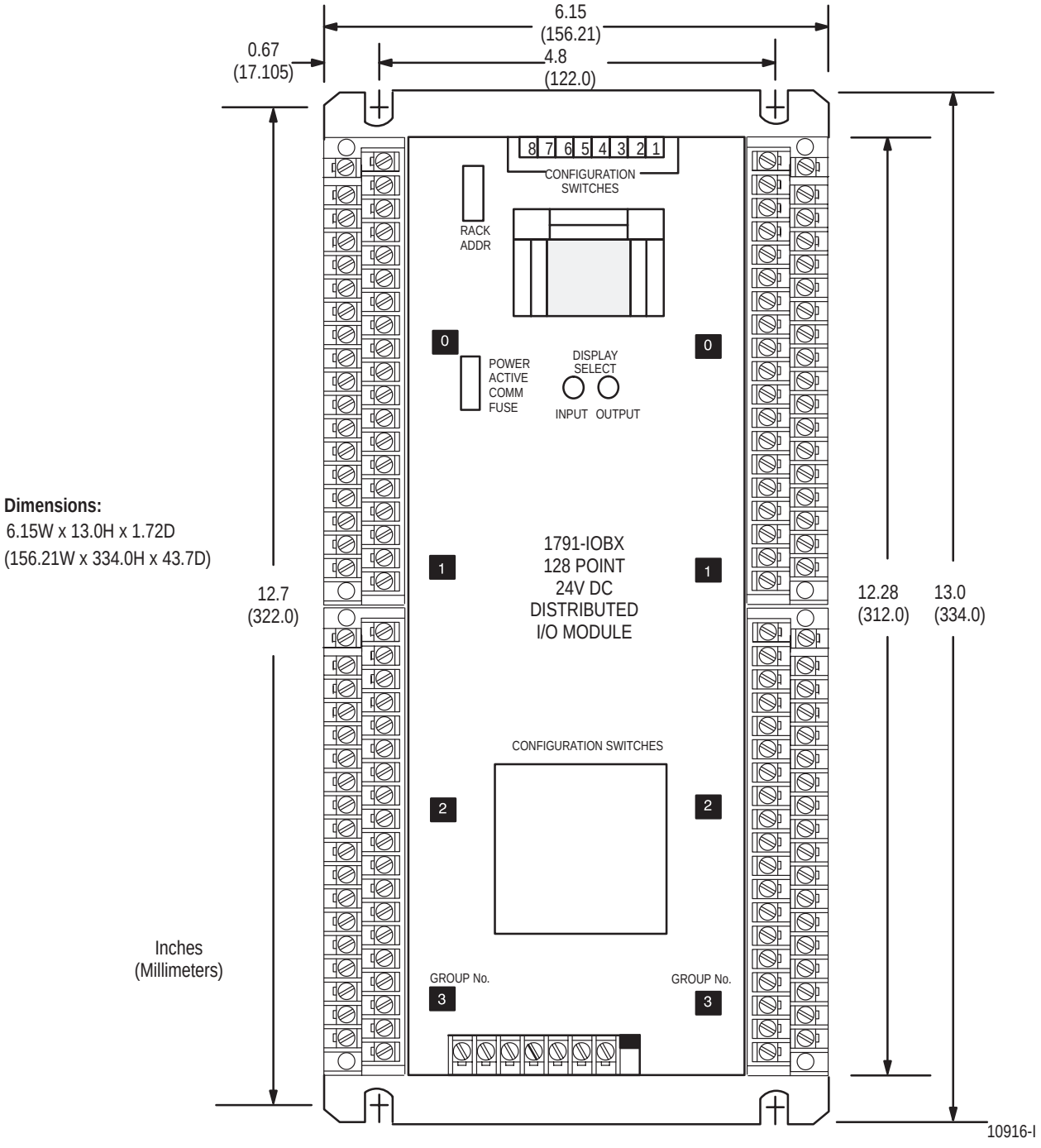
Before installation, you must determine:

- the number of blocks desired
- the total distance of the installation
- transmission rate desired

Installing the Block I/O

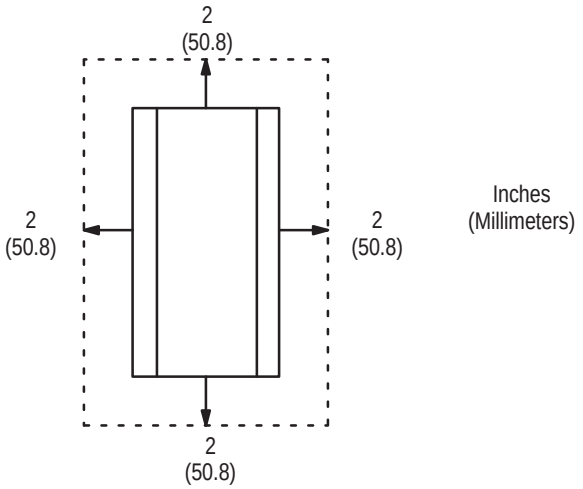
Mounting dimensions for the block I/O module are shown in Figure 2.1. Mount the blocks horizontally with a minimum of 2” between blocks. This air gap is necessary to maintain proper cooling air flow through the block.

Figure 2.1
Mounting Dimensions for the Block I/O Module (Cat. No. 1791-IOBX and -IOVX)



The operating temperature in the air gap between block I/O modules must not exceed 60ºC (140ºF). The dimensions of the air gap required are shown in Figure 2.2.

Figure 2.2
Clearance Required for Block I/O Modules



Connecting Wiring

Connections to the block I/O module are made to the removable terminal blocks on each side of the module. Input connections are on the left side, and output connections are on the right side. The input terminal blocks are keyed differently than the output blocks to prevent incorrect insertion.

ATTENTION: Both input terminal blocks are keyed alike. If removed for wiring, or module replacement, make certain that the terminal blocks are placed in their proper position when reinstalling.

Wiring connections for the 1791-IOBX and -IOVX are shown in Tables 2.A through 2.H.

Catalog Number 1794-IOBX		Catalog Number 1794-IOVX	
Input Terminal Wiring		**Input Terminal Wiring**	
Groups 0 and 1 (TRM1)	Table 2.A, page 2-4	Groups 0 and 1 (TRM1)	Table 2.E, page 2-8
Groups 2 and 3 (TRM2)	Table 2.B, page 2-5	Groups 2 and 3 (TRM2)	Table 2.F, page 2-9
Output Terminal Wiring		**Output Terminal Wiring**	
Groups 0 and 1 (TRM3)	Table 2.C, page 2-6	Groups 0 and 1 (TRM3)	Table 2.G, page 2-10
Groups 2 and 3 (TRM4)	Table 2.D, page 2-7	Groups 2 and 3 (TRM4)	Table 2.H, page 2-11

Remote I/O link wiring connections are shown in Figure 2.3.

Table 2.A
1791-IOBX Input Terminal Wiring for Groups 0 and 1 (TRM1) for PLC Family Controllers and SLC Processors

Terminal Number	Input Assignment Group 0		Terminal Number	Input Assignment Group 1	
	PLC	SLC		PLC	SLC
1	Common A	Common A	19	Common B	Common B
2	Input 00	Input 00	20	Input 00	Input 00
3	Input 01	Input 01	21	Input 01	Input 01
4	Input 02	Input 02	22	Input 02	Input 02
5	Input 03	Input 03	23	Input 03	Input 03
6	Input 04	Input 04	24	Input 04	Input 04
7	Input 05	Input 05	25	Input 05	Input 05
8	Input 06	Input 06	26	Input 06	Input 06
9	Input 07	Input 07	27	Input 07	Input 07
10	Input 10	Input 08	28	Input 10	Input 08
11	Input 11	Input 09	29	Input 11	Input 09
12	Input 12	Input 10	30	Input 12	Input 10
13	Input 13	Input 11	31	Input 13	Input 11
14	Input 14	Input 12	32	Input 14	Input 12
15	Input 15	Input 13	33	Input 15	Input 13
16	Input 16	Input 14	34	Input 16	Input 14
17	Input 17	Input 15	35	Input 17	Input 15
18	N.C.	N.C.	36	N.C.	N.C.
			37	N.C.	N.C.

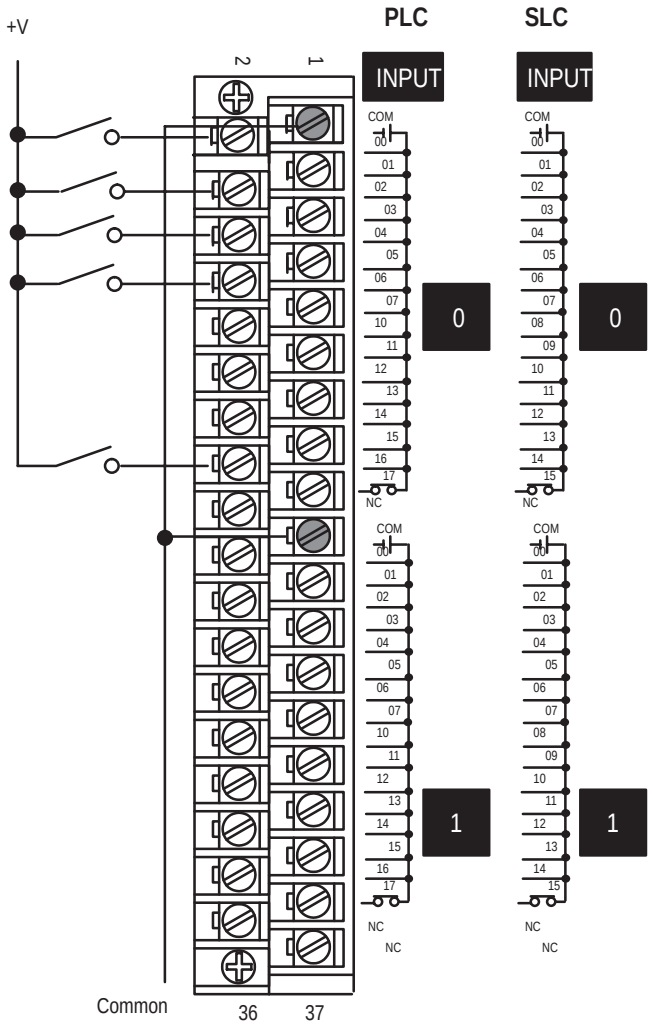


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Table 2.B
1791-IOBX Input Terminal Wiring for Groups 2 and 3 (TRM2) for PLC Family Programmable Controllers and SLC Processors

Terminal Number	Input Assignment Group 2		Terminal Number	Input Assignment Group 3	
	PLC	SLC		PLC	SLC
1	Common C	Common C	19	Common D	Common D
2	Input 00	Input 00	20	Input 00	Input 00
3	Input 01	Input 01	21	Input 01	Input 01
4	Input 02	Input 02	22	Input 02	Input 02
5	Input 03	Input 03	23	Input 03	Input 03
6	Input 04	Input 04	24	Input 04	Input 04
7	Input 05	Input 05	25	Input 05	Input 05
8	Input 06	Input 06	26	Input 06	Input 06
9	Input 07	Input 07	27	Input 07	Input 07
10	Input 10	Input 08	28	Input 10	Input 08
11	Input 11	Input 09	29	Input 11	Input 09
12	Input 12	Input 10	30	Input 12	Input 10
13	Input 13	Input 11	31	Input 13	Input 11
14	Input 14	Input 12	32	Input 14	Input 12
15	Input 15	Input 13	33	Input 15	Input 13
16	Input 16	Input 14	34	Input 16	Input 14
17	Input 17	Input 15	35	Input 17	Input 15
18	N.C.	N.C.	36	N.C.	N.C.
			37	N.C.	N.C.

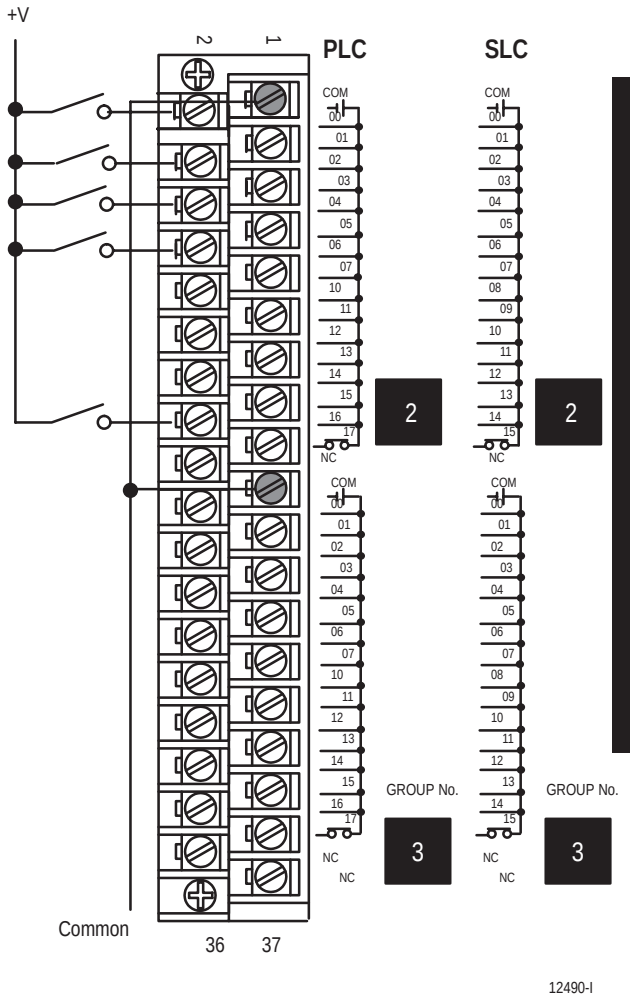

Table 2.C
1791-IOBX Output Terminal Wiring for Groups 0 and 1 (TRM3) for PLC Family Programmable Controllers

Terminal Number	Output Assignment Group 1		Terminal Number	Output Assignment Group 0	
	PLC	SLC		PLC	SLC
1	N.C.	N.C.	20	Common A	Common A
2	Common B	Common B	21	Output 17	Output 15
3	Output 17	Output 15	22	Output 16	Output 14
4	Output 16	Output 14	23	Output 15	Output 13
5	Output 15	Output 13	24	Output 14	Output 12
6	Output 14	Output 12	25	Output 13	Output 11
7	Output 13	Output 11	26	Output 12	Output 10
8	Output 12	Output 10	27	Output 11	Output 09
9	Output 11	Output 09	28	Output 10	Output 08
10	Output 10	Output 08	29	Output 07	Output 07
11	Output 07	Output 07	30	Output 06	Output 06
12	Output 06	Output 06	31	Output 05	Output 05
13	Output 05	Output 05	32	Output 04	Output 04
14	Output 04	Output 04	33	Output 03	Output 03
15	Output 03	Output 03	34	Output 02	Output 02
16	Output 02	Output 02	35	Output 01	Output 01
17	Output 01	Output 01	36	Output 00	Output 00
18	Output 00	Output 00	37	VDC A	VDC A
19	VDC B	VDC B			

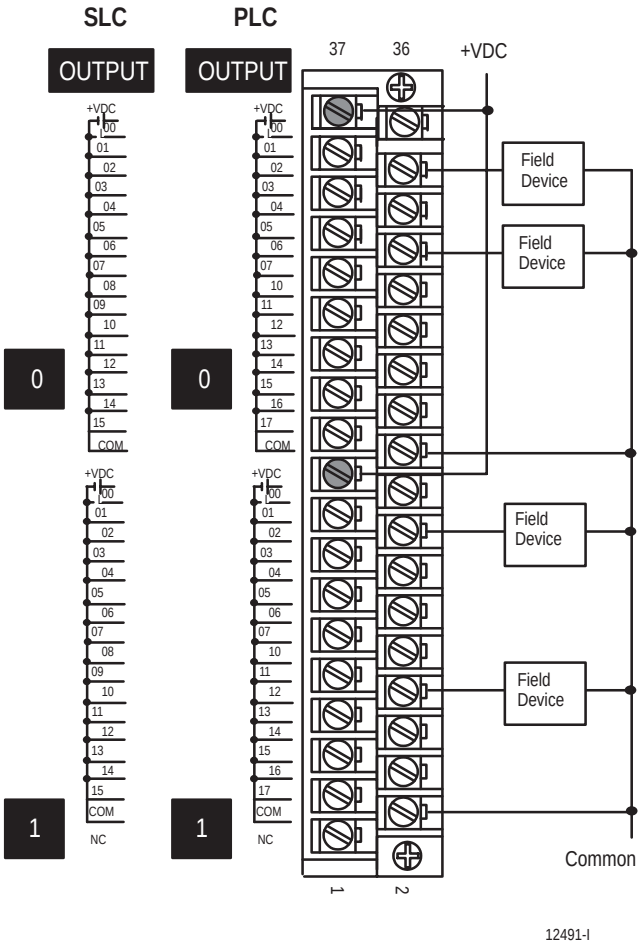

Table 2.D
1791-IOBX Output Terminal Wiring for Groups 2 and 3 (TRM4) for PLC Family Programmable Controllers

Terminal Number	Output Assignment Group 3		Terminal Number	Output Assignment Group 2	
	PLC	SLC		PLC	SLC
1	N.C.	N.C.	20	Common C	Common C
2	Common D	Common D	21	Output 17	Output 15
3	Output 17	Output 15	22	Output 16	Output 14
4	Output 16	Output 14	23	Output 15	Output 13
5	Output 15	Output 13	24	Output 14	Output 12
6	Output 14	Output 12	25	Output 13	Output 11
7	Output 13	Output 11	26	Output 12	Output 10
8	Output 12	Output 10	27	Output 11	Output 09
9	Output 11	Output 09	28	Output 10	Output 08
10	Output 10	Output 08	29	Output 07	Output 07
11	Output 07	Output 07	30	Output 06	Output 06
12	Output 06	Output 06	31	Output 05	Output 05
13	Output 05	Output 05	32	Output 04	Output 04
14	Output 04	Output 04	33	Output 03	Output 03
15	Output 03	Output 03	34	Output 02	Output 02
16	Output 02	Output 02	35	Output 01	Output 01
17	Output 01	Output 01	36	Output 00	Output 00
18	Output 00	Output 00	37	VDC C	VDC C
19	VDC D	VDC D			

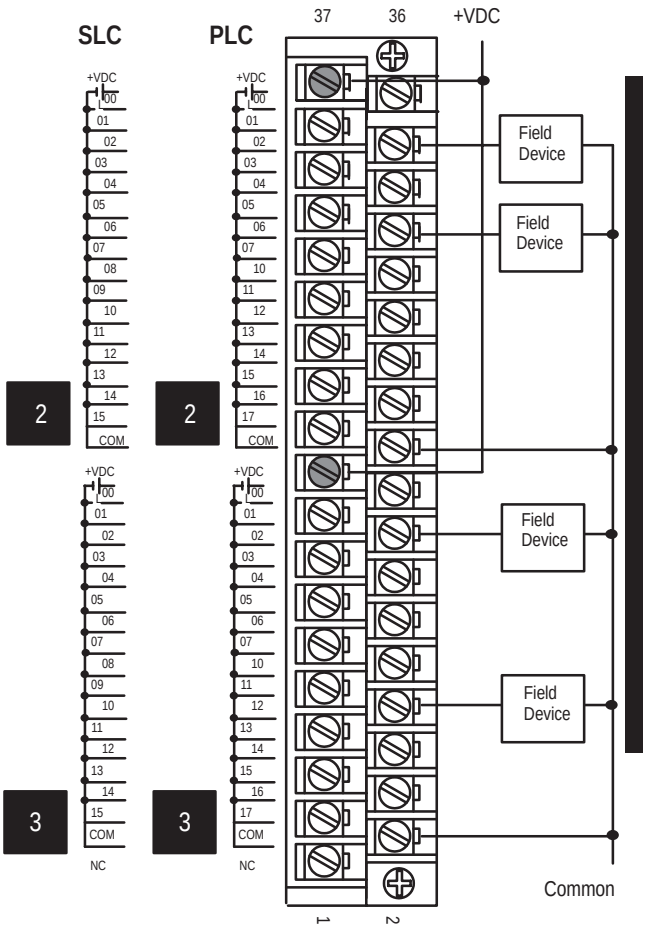

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Table 2.E
1791-IOVX Input Terminal Wiring for Groups 0 and 1 (TRM1) for PLC Family Programmable Controllers

Terminal Number	Input Assignment Group 0		Terminal Number	Input Assignment Group 1	
	PLC	SLC		PLC	SLC
1	VDC A	VDC A	19	VDC B	VDC B
2	Input 00	Input 00	20	Input 00	Input 00
3	Input 01	Input 01	21	Input 01	Input 01
4	Input 02	Input 02	22	Input 02	Input 02
5	Input 03	Input 03	23	Input 03	Input 03
6	Input 04	Input 04	24	Input 04	Input 04
7	Input 05	Input 05	25	Input 05	Input 05
8	Input 06	Input 06	26	Input 06	Input 06
9	Input 07	Input 07	27	Input 07	Input 07
10	Input 10	Input 08	28	Input 10	Input 08
11	Input 11	Input 09	29	Input 11	Input 09
12	Input 12	Input 10	30	Input 12	Input 10
13	Input 13	Input 11	31	Input 13	Input 11
14	Input 14	Input 12	32	Input 14	Input 12
15	Input 15	Input 13	33	Input 15	Input 13
16	Input 16	Input 14	34	Input 16	Input 14
17	Input 17	Input 15	35	Input 17	Input 15
18	N.C.	N.C.	36	N.C.	N.C.
			37	N.C.	N.C.

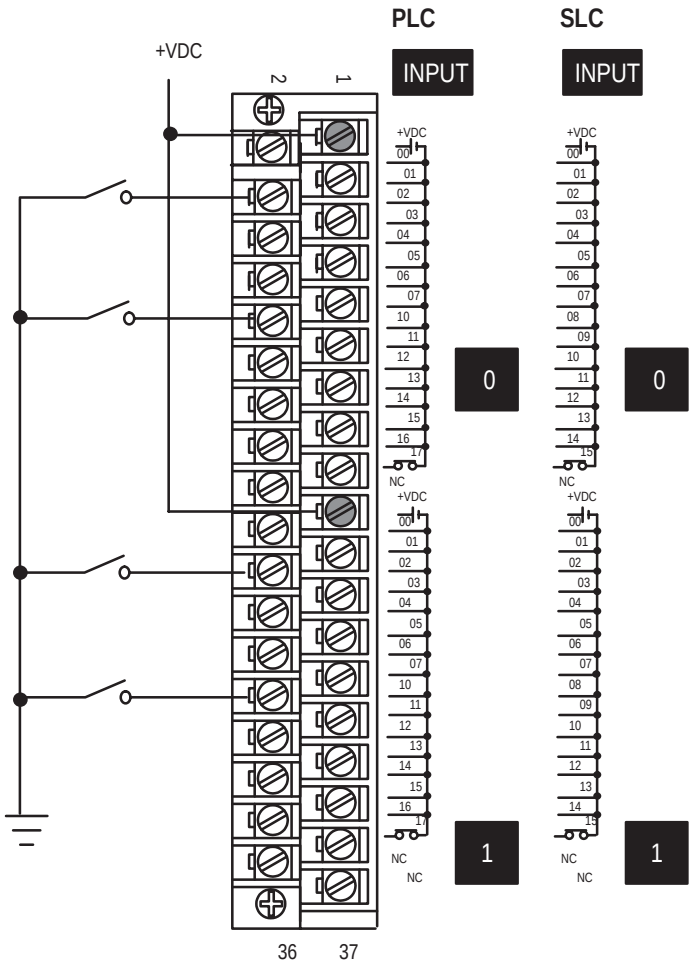

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Table 2.F
1791-IOVX Input Terminal Wiring for Groups 2 and 3 (TRM2) for PLC Family Programmable Controllers

Terminal Number	Input Assignment Group 2		Terminal Number	Input Assignment Group 3	
	PLC	SLC		PLC	SLC
1	VDC C	VDC C	19	VDC D	VDC D
2	Input 00	Input 00	20	Input 00	Input 00
3	Input 01	Input 01	21	Input 01	Input 01
4	Input 02	Input 02	22	Input 02	Input 02
5	Input 03	Input 03	23	Input 03	Input 03
6	Input 04	Input 04	24	Input 04	Input 04
7	Input 05	Input 05	25	Input 05	Input 05
8	Input 06	Input 06	26	Input 06	Input 06
9	Input 07	Input 07	27	Input 07	Input 07
10	Input 10	Input 08	28	Input 10	Input 08
11	Input 11	Input 09	29	Input 11	Input 09
12	Input 12	Input 10	30	Input 12	Input 10
13	Input 13	Input 11	31	Input 13	Input 11
14	Input 14	Input 12	32	Input 14	Input 12
15	Input 15	Input 13	33	Input 15	Input 13
16	Input 16	Input 14	34	Input 16	Input 14
17	Input 17	Input 15	35	Input 17	Input 15
18	N.C.	N.C.	36	N.C.	N.C.
			37	N.C.	N.C.

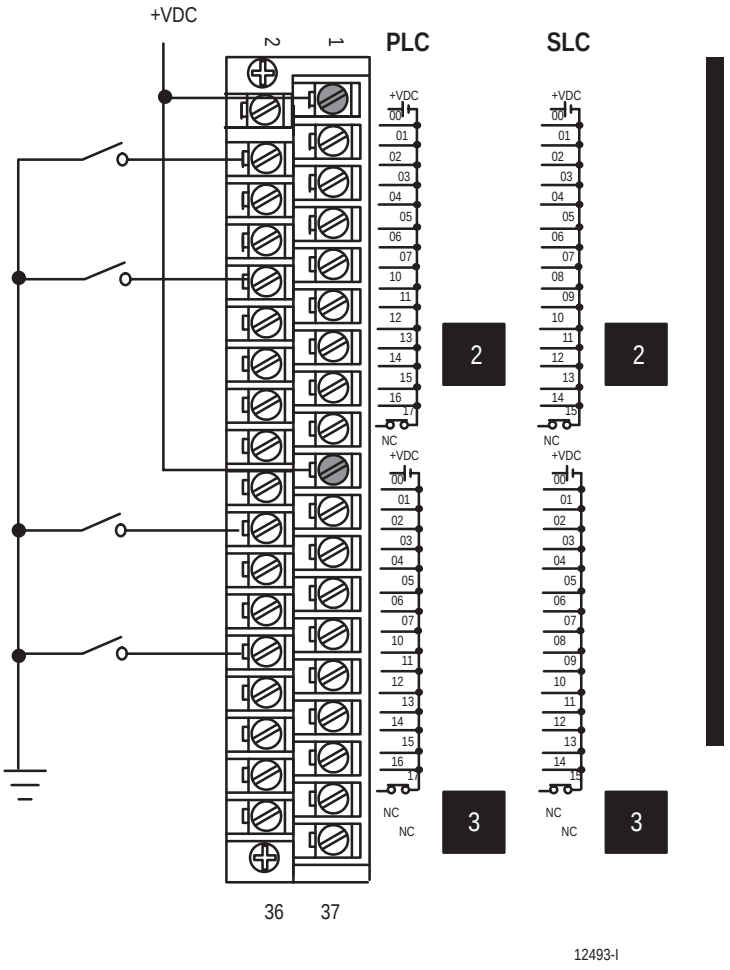

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Table 2.G
1791-IOVX Output Terminal Wiring for Groups 0 and 1 (TRM3) for PLC Family Programmable Controllers

Terminal Number	Output Assignment Group 1		Terminal Number	Output Assignment Group 0	
	PLC	SLC		PLC	SLC
1	N.C.	N.C.	20	Common A	Common A
2	Common B	Common B	21	Output 17	Output 15
3	Output 17	Output 15	22	Output 16	Output 14
4	Output 16	Output 14	23	Output 15	Output 13
5	Output 15	Output 13	24	Output 14	Output 12
6	Output 14	Output 12	25	Output 13	Output 11
7	Output 13	Output 11	26	Output 12	Output 10
8	Output 12	Output 10	27	Output 11	Output 09
9	Output 11	Output 09	28	Output 10	Output 08
10	Output 10	Output 08	29	Output 07	Output 07
11	Output 07	Output 07	30	Output 06	Output 06
12	Output 06	Output 06	31	Output 05	Output 05
13	Output 05	Output 05	32	Output 04	Output 04
14	Output 04	Output 04	33	Output 03	Output 03
15	Output 03	Output 03	34	Output 02	Output 02
16	Output 02	Output 02	35	Output 01	Output 01
17	Output 01	Output 01	36	Output 00	Output 00
18	Output 00	Output 00	37	VDC A	VDC A
19	VDC B	VDC B			

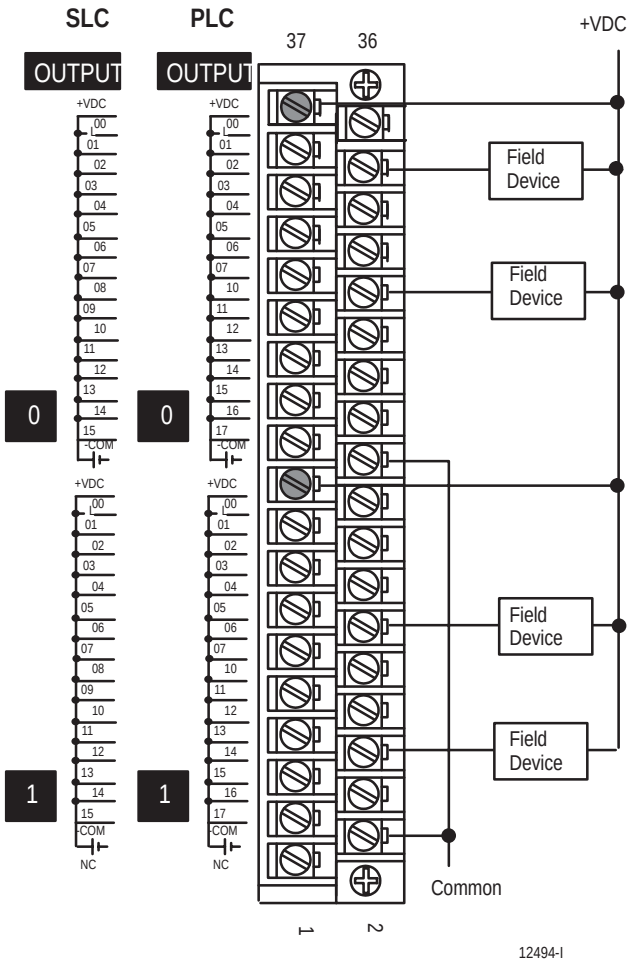


Table 2.H
1791-IOVX Output Terminal Wiring for Groups 2 and 3 (TRM4) for PLC Family Programmable Controllers

Terminal Number	Output Assignment Group 3		Terminal Number	Output Assignment Group 2	
	PLC	SLC		PLC	SLC
1	N.C.	N.C.	20	Common C	Common C
2	Common D	Common D	21	Output 17	Output 15
3	Output 17	Output 15	22	Output 16	Output 14
4	Output 16	Output 14	23	Output 15	Output 13
5	Output 15	Output 13	24	Output 14	Output 12
6	Output 14	Output 12	25	Output 13	Output 11
7	Output 13	Output 11	26	Output 12	Output 10
8	Output 12	Output 10	27	Output 11	Output 09
9	Output 11	Output 09	28	Output 10	Output 08
10	Output 10	Output 08	29	Output 07	Output 07
11	Output 07	Output 07	30	Output 06	Output 06
12	Output 06	Output 06	31	Output 05	Output 05
13	Output 05	Output 05	32	Output 04	Output 04
14	Output 04	Output 04	33	Output 03	Output 03
15	Output 03	Output 03	34	Output 02	Output 02
16	Output 02	Output 02	35	Output 01	Output 01
17	Output 01	Output 01	36	Output 00	Output 00
18	Output 00	Output 00	37	VDC C	VDC C
19	VDC D	VDC D			

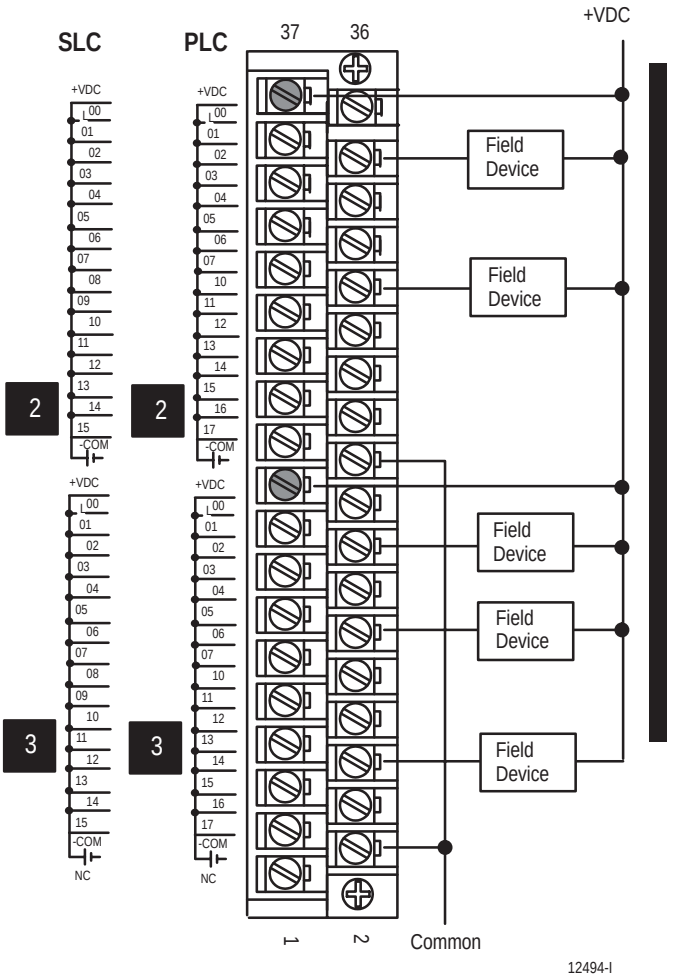


Table 2.I
Wiring Block Designations

Connector	Designation	Description
Remote I/O Connector	1 (BLU)	Blue wire - RIO
	2 (CLR)	Clear wire - RIO
	Shield	Shield - RIO
	Chassis GND	Chassis Ground
	24VDC RET	+24V ground
	24VDC	+24V dc
Input Terminals	1 thru 37	See Tables
Output Terminals	1 thru 37	See Tables

Power Supply Requirements

An external 24V dc (+10/-25%) power supply is required to power the block. Total current required to power the block is equal to 300mA.

In addition, the external power supply should have current limiting capabilities. The voltage range must not exceed 18.0-26.4V dc.

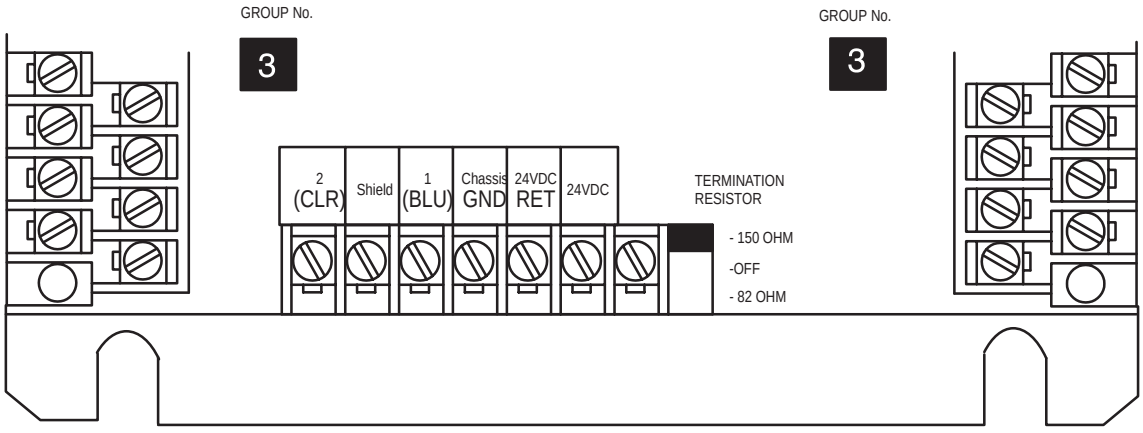
Wiring Requirements

Wiring cable requirements are shown in Table 2.J.

Table 2.J
Acceptable Wiring Cables for Block I/O Connection

Use	Cable Type	With
Remote I/O Link	Belden 9463	PLC-2, PLC-3, PLC-5 family programmable controllers and SLC controllers
Input and Output wiring	Up to 14AWG (2mm[2)] Stranded with 3/64 inch (1.2mm) insulation	All

Figure 2.3
Remote I/O Link Wiring



Connection	1 (BLU)	2 (CLR)	Shield
Clear wire		X	
Blue wire	X		
Shield wire			X

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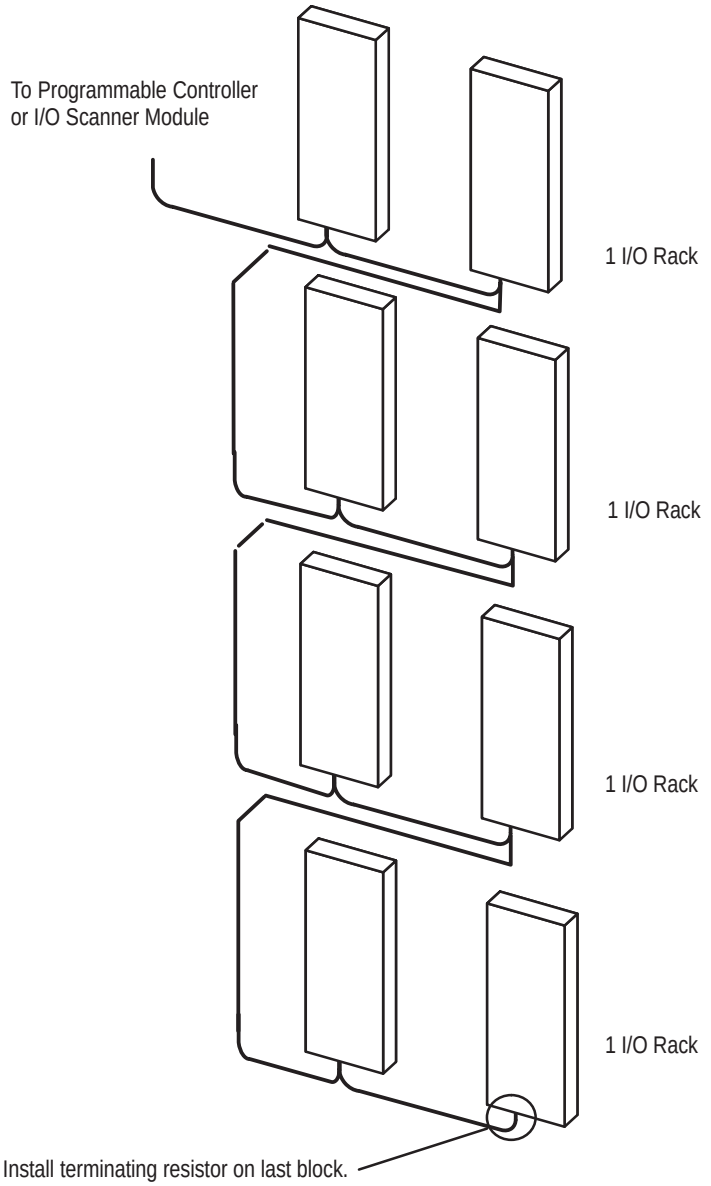
Remote I/O Link Wiring

Blocks must be wired in series as shown in Figure 2.4. Do not attempt to wire any block in parallel.

The number of blocks used depends not only on the user requirements but also on the system used.

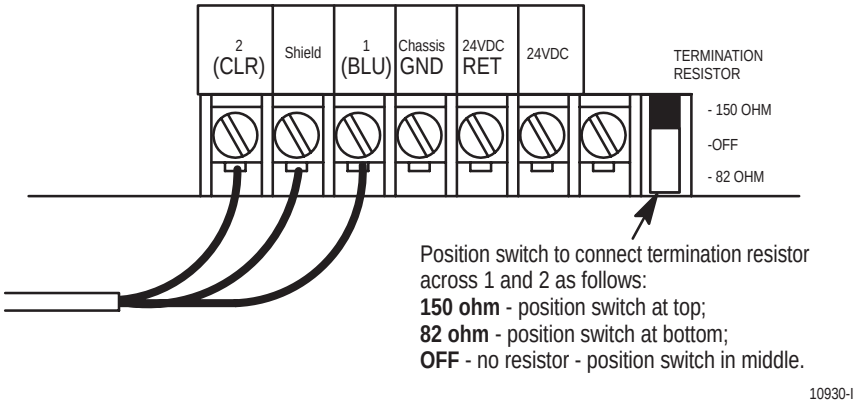
Figure 2.4
Series Connection for Block I/O Using PLC-2, PLC-3 or PLC-5 Family Programmable Controllers



Termination Resistor

A termination resistor must be used on the last block in the series. A 150 ohm and 82 ohm termination resistors are built into the unit. To select the termination resistor, position the switch to the desired position as shown in Figure 2.5.

Figure 2.5
Installing the Termination Resistor



Extended Node Capability

If this is the last remote I/O adapter on the RIO link in a PLC system, you must use a terminating resistor to terminate both ends of the remote I/O link (scanner end and last block end). The size of the terminator is determined by the system configuration.

Older configurations can use a 150 ohm resistor at both ends. With newer devices that can support it, you can use an 82 ohm termination resistor at both ends. The 82 ohm terminators provide “extended node” capability which allows you to have up to 32 physical devices on the RIO link. (The number of logical racks capable of being addressed by the scanner is not affected.)

ATTENTION: Devices that are operating at 230.4K baud must have 82 ohm terminators in place for proper operation.

Compatibility of 1771 I/O Products with Extended Node Operation

Certain products are not compatible with extended node capabilities obtained with the use of 82 ohm terminators. The following table lists those products that are **not** compatible.

Device		Series
Scanners -1771-SN		All
	1772-SD	All
	1772-SD2	All
	1775-SR[1]	All
	1775-S4A[1]	All
	1775-S4B[1]	All
Adapters -	1771-AS	All
	1771-ASB	Series A
	1771-DCM	All
Miscellaneous -	1771-AF	All
	1771-AF1	All

[1] When using PLC-3 programmable controllers, you must use a 1775-S5 or -SR5 scanner module. **Do not use** 1775-SR, -S4A or -S4B scanner modules.

Fusing

1791 high-density block I/O modules (64 and 128 input/output) have internal fusing. Each group of 16 output points is protected by a 5.0A fuse. These fuses protect the user output devices. They do not protect each individual output from overload. It is recommended that individual outputs be fused externally to protect the individual output circuit.

Catalog Number	Voltage	Maximum Output Rating at: 30°C 60°C	Maximum Surge Current
1791-IOBX	24V dc	300mA per point 2.4A continuous per 16 point group	maximum surge current 1.0A for 25ms 1 pulse per second maximum
1791-IOVX	24V dc		

Consult the factory for fuse recommendations.

Summary

In this chapter you learned how to physically mount your block I/O, make power wiring connections, how to make the input/output wiring connections to the block, and how to terminate the remote I/O link.

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Chapter 3

Configuring Your Block I/O

Chapter Objectives

In this chapter you will learn how to configure your block I/O when used with PLC family programmable controllers. This includes the following:

- setting the configuration switches
- addressing the block I/O

To learn how to configure your block I/O when used with SLC 500 processors, refer to the publication for the 1747-SN Remote I/O Scanner Module.

Setting the Configuration Switches

Each block I/O module has multiple-position switches for setting:

- **transmission (baud) rate** - used to set the communication rate chosen for the remote I/O link
- **last state** - when last state is enabled, a processor reset will keep the outputs in their present (last) state; when last state is disabled, the outputs will reset
- **processor restart lockout (PRL)** - when PRL is enabled (switch 4 on), the programmable controller cannot automatically start up the module's communications if the power has been cycled to either the module or the programmable controller. Press Input and Output pushbuttons simultaneously to reset PRL.
- **last rack** - used to identify if the module contains the highest numbered I/O group for the associated rack number
- **I/O group address** - used to identify which module group (0-3 or 4-7) the module should assign to its inputs/outputs
- **rack address** - used to select the rack address of the module
- **RIO termination resistor** - used to connect an internal resistor (82 ohm, 150 ohm, or no resistor) across LINE 1 and 2 on the remote I/O terminals

These switches are all accessible on the front or top of the module, as shown in Figure 3.1.

Figure 3.1
Switch Setting Locations (1791-IOBX shown)

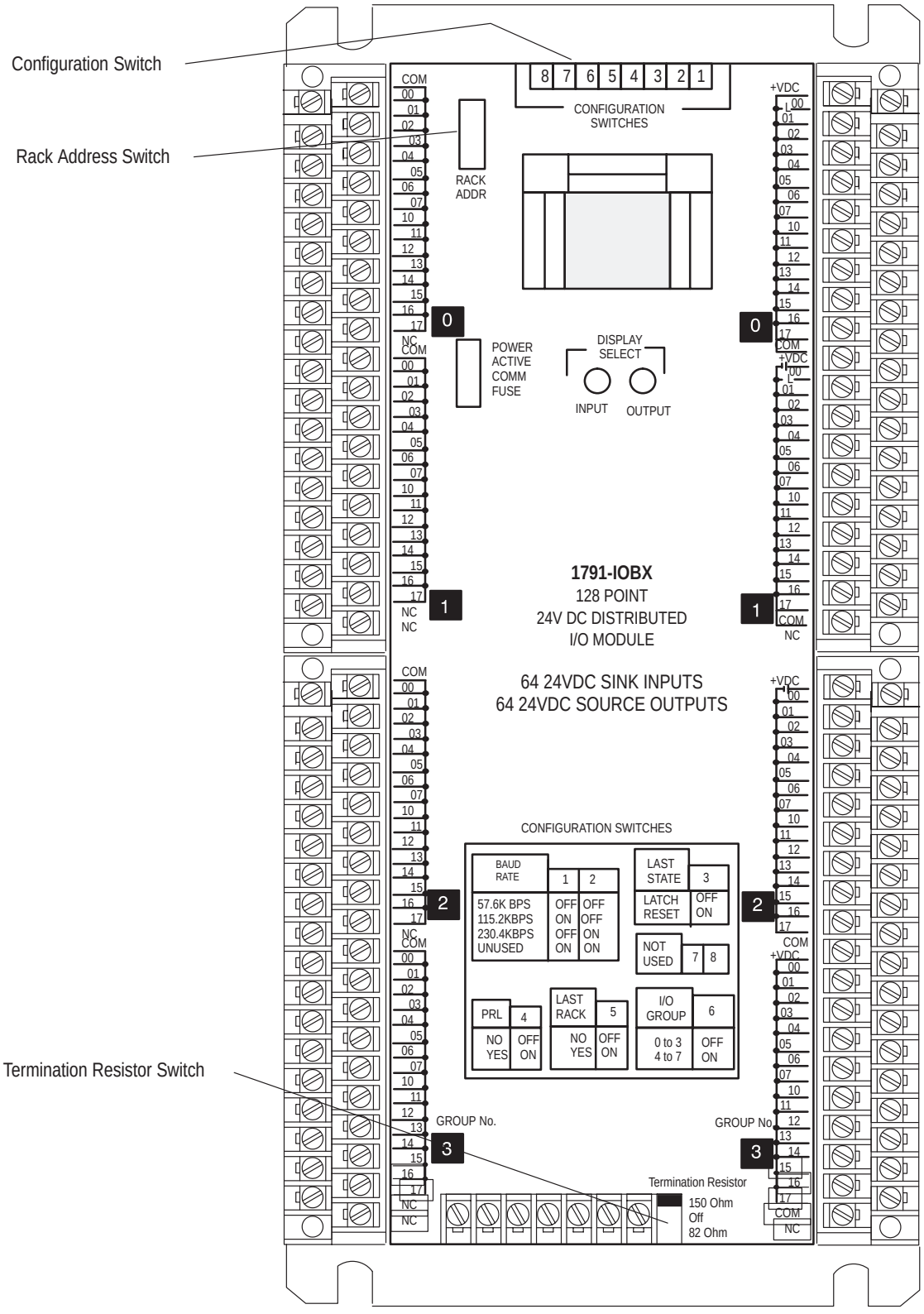

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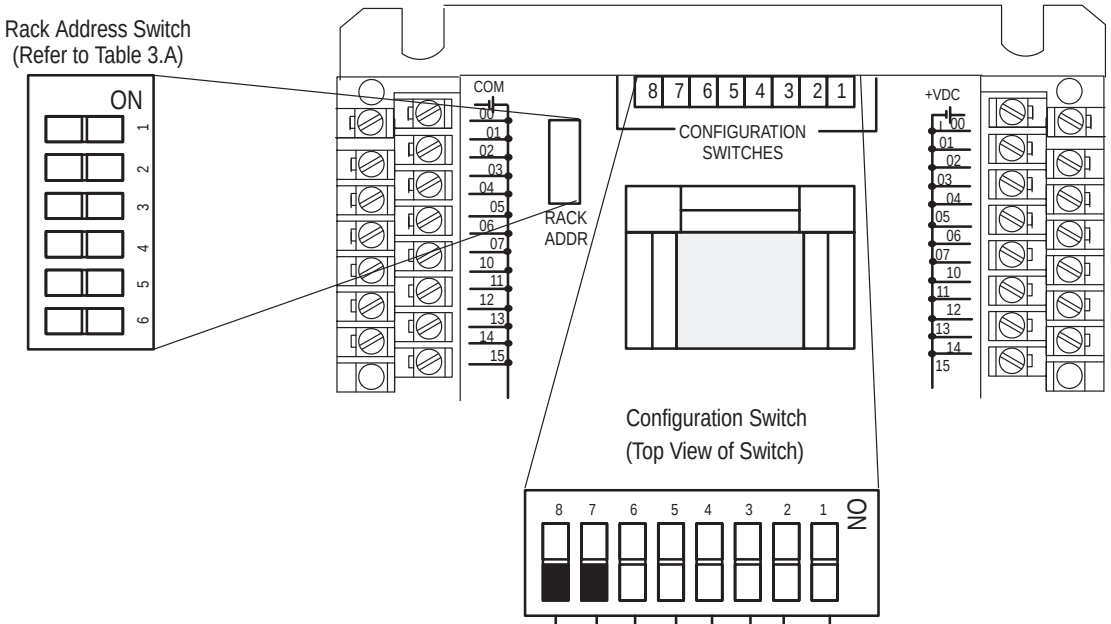
Figure 3.2
Configuration Switch Settings (PLC designations shown)



Not Used - set to off	7	8

I/O Group	6
0 to 3	OFF
4 to 7	ON

LAST RACK	5
NO	OFF
YES	ON

Last Rack Switch 5

PLC-2
OFF - When module **does not** contain the highest numbered I/O group for the associated rack number.
ON - When module **does** contain the highest numbered I/O group for the associated rack number.
PLC-3
This switch must always be set to "OFF."
PLC-5
This switch not used.

BAUD RATE	1	2
57.6kbps	OFF	OFF
115.2kbps	ON	OFF
230.4kbps	OFF	ON
Unused	ON	ON

LAST STATE	3
Latch	OFF
Reset	ON

Last State Switch 3
CAUTION: Set switch 3 to the ON position to deenergize outputs wired to this module when a fault is detected. If switch 3 is set to the OFF position, outputs connected to this module remain in their last state when a fault occurs and machine motion may continue after fault detection.

PRL	4
Disabled	OFF
Enabled	ON

Processor Restart Lockout (PRL) Switch 4 - When PRL is enabled (on), the programmable controller cannot automatically start up the module's communications if the power has been cycled to either the module or the programmable controller

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Table 3.A
Rack Address Switch Settings

1747-SN Rack Number	1771-SN Rack Number	PLC-2 Rack Number	PLC-5 Rack Number	PLC-5/250 Rack Number	PLC-3 Rack Number	Rack Address Switch Position					
						6	5	4	3	2	1
Rack 0	Rack 1	Rack 1	Not Valid	Rack 0	Rack 0	0	0	0	0	0	0
Rack 1	Rack 2	Rack 2	Rack 1	Rack 1	Rack 1	0	0	0	0	0	1
Rack 2	Rack 3	Rack 3	Rack 2	Rack 2	Rack 2	0	0	0	0	1	0
Rack 3	Rack 4	Rack 4	Rack 3	Rack 3	Rack 3	0	0	0	0	1	1
	Rack 5	Rack 5	Rack 4	Rack 4	Rack 4	0	0	0	1	0	0
	Rack 6	Rack 6	Rack 5	Rack 5	Rack 5	0	0	0	1	0	1
	Rack 7	Rack 7	Rack 6	Rack 6	Rack 6	0	0	0	1	1	0
			Rack 7	Rack 7	Rack 7	0	0	0	1	1	1
			Rack 10	Rack 10	Rack 10	0	0	1	0	0	0
			Rack 11	Rack 11	Rack 11	0	0	1	0	0	1
			Rack 12	Rack 12	Rack 12	0	0	1	0	1	0
			Rack 13	Rack 13	Rack 13	0	0	1	0	1	1
			Rack 14	Rack 14	Rack 14	0	0	1	1	0	0
			Rack 15	Rack 15	Rack 15	0	0	1	1	0	1
			Rack 16	Rack 16	Rack 16	0	0	1	1	1	0
			Rack 17	Rack 17	Rack 17	0	0	1	1	1	1
			Rack 20	Rack 20	Rack 20	0	1	0	0	0	0
			Rack 21	Rack 21	Rack 21	0	1	0	0	0	1
			Rack 22	Rack 22	Rack 22	0	1	0	0	1	0
			Rack 23	Rack 23	Rack 23	0	1	0	0	1	1
			Rack 24	Rack 24	Rack 24	0	1	0	1	0	0
			Rack 25	Rack 25	Rack 25	0	1	0	1	0	1
			Rack 26	Rack 26	Rack 26	0	1	0	1	1	0
			Rack 27	Rack 27	Rack 27	0	1	0	1	1	1
				Rack 30	Rack 30	0	1	1	0	0	0
				Rack 31	Rack 31	0	1	1	0	0	1
				Rack 32	Rack 32	0	1	1	0	1	0
				Rack 33	Rack 33	0	1	1	0	1	1
				Rack 34	Rack 34	0	1	1	1	0	0
				Rack 35	Rack 35	0	1	1	1	0	1
				Rack 36	Rack 36	0	1	1	1	1	0
				Rack 37	Rack 37	0	1	1	1	1	1
					Rack 40	1	0	0	0	0	0
					Rack 41	1	0	0	0	0	1
					Rack 42	1	0	0	0	1	0
					Rack 43	1	0	0	0	1	1
					Rack 44	1	0	0	1	0	0
					Rack 45	1	0	0	1	0	1
					Rack 46	1	0	0	1	1	0
					Rack 47	1	0	0	1	1	1
					Rack 50	1	0	1	0	0	0
					Rack 51	1	0	1	0	0	1
					Rack 52	1	0	1	0	1	0
					Rack 53	1	0	1	0	1	1
					Rack 54	1	0	1	1	0	0
					Rack 55	1	0	1	1	0	1
					Rack 56	1	0	1	1	1	0
					Rack 57	1	0	1	1	1	1
					Rack 60	1	1	0	0	0	0
					Rack 61	1	1	0	0	0	1
					Rack 62	1	1	0	0	1	0

1747-SN Rack Number	1771-SN Rack Number	PLC-2 Rack Number	PLC-5 Rack Number	PLC-5/250 Rack Number	PLC-3 Rack Number	Rack Address Switch Position					
						6	5	4	3	2	1
					Rack 63	1	1	0	0	1	1
					Rack 64	1	1	0	1	0	0
					Rack 65	1	1	0	1	0	1
					Rack 66	1	1	0	1	1	0
					Rack 67	1	1	0	1	1	1
					Rack 70	1	1	1	0	0	0
					Rack 71	1	1	1	0	0	1
					Rack 72	1	1	1	0	1	0
					Rack 73	1	1	1	0	1	1
					Rack 74	1	1	1	1	0	0
					Rack 75	1	1	1	1	0	1
					Rack 76	1	1	1	1	1	0
					Not Valid	1	1	1	1	1	1

Rack address 77 is an illegal configuration.
PLC-5/11 processors can scan rack 03.
PLC-5/15 and PLC-5/20 processors can scan racks 01-03.
PLC-5/25 and PLC-5/30 processors can scan racks 01-07.
PLC-5/40 and PLC-5/40L processors can scan racks 01-17.
PLC-5/60 and PLC-5/60L processors can scan racks 01-27.
PLC-5/250 processors can scan racks 00-37.
PLC-3 processors can scan racks 00-76.

Each block uses 4 words of output image table memory and 4 words of input image table memory. Each block occupies 1/2 rack of data table, with 2 blocks comprising 1 logical rack. Image table usage for one assigned rack number is shown in Figure 3.3. An example of image table usage is shown in Figure 3.4.

Figure 3.3
I/O Image Table for One Assigned Rack Number

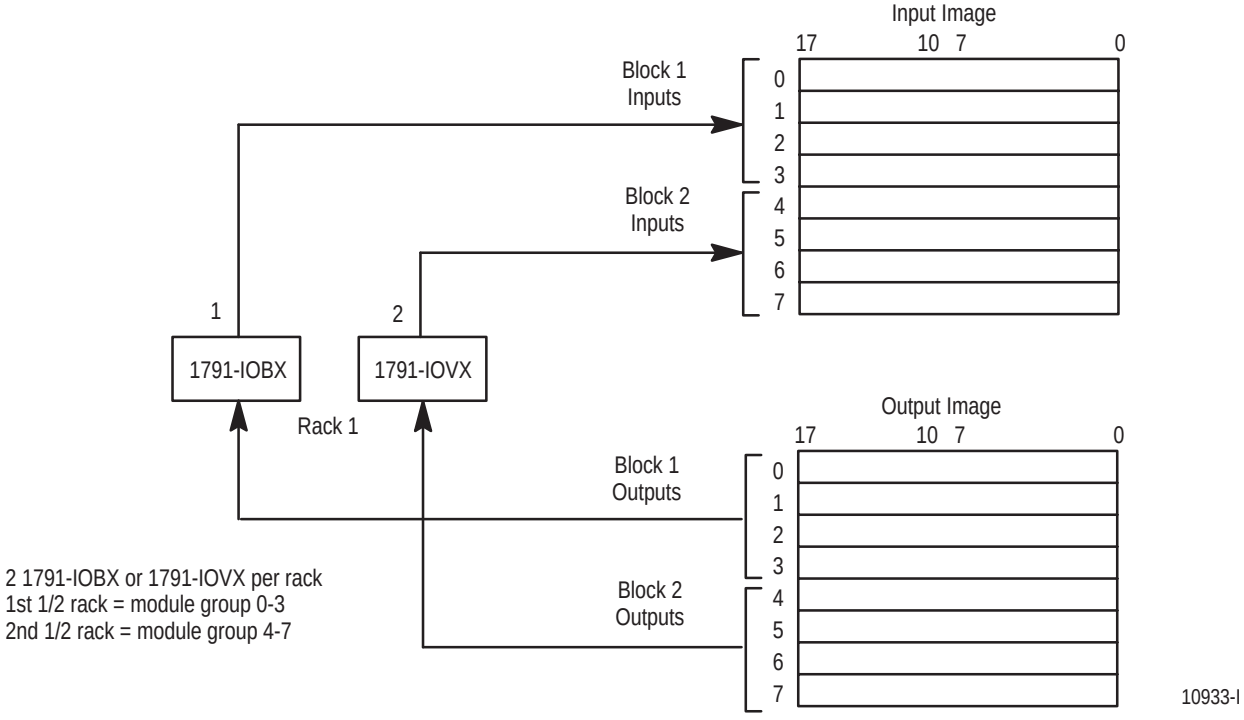

Figure 3.4
Input Table Usage Example for One Starting I/O Group with 1791-IOBX and -IOVX

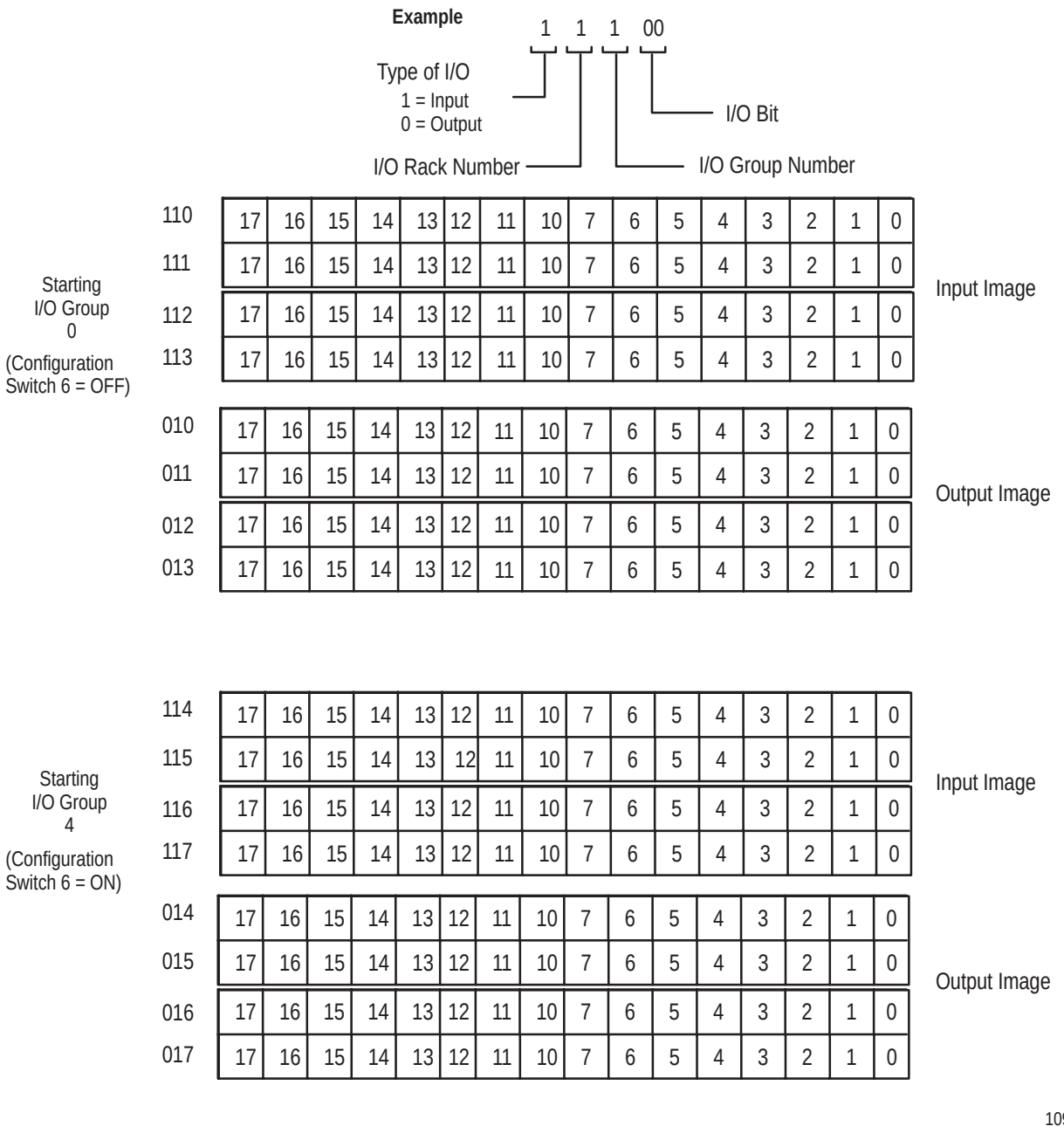

Table 3.B
1791-IOBX Input Terminal Addressing for Groups 0 and 1 (TRM1)

Terminal Number	Input Assignment Group 0	Program Address	Terminal Number	Input Assignment Group 1	Program Address
1	Common A		19	Common B	
2	Input 00	1XY00	20	Input 00	1X(Y+1)00
3	Input 01	1XY01	21	Input 01	1X(Y+1)01
4	Input 02	1XY02	22	Input 02	1X(Y+1)02
5	Input 03	1XY03	23	Input 03	1X(Y+1)03
6	Input 04	1XY04	24	Input 04	1X(Y+1)04
7	Input 05	1XY05	25	Input 05	1X(Y+1)05
8	Input 06	1XY06	26	Input 06	1X(Y+1)06
9	Input 07	1XY07	27	Input 07	1X(Y+1)07
10	Input 10	1XY10	28	Input 10	1X(Y+1)10
11	Input 11	1XY11	29	Input 11	1X(Y+1)11
12	Input 12	1XY12	30	Input 12	1X(Y+1)12
13	Input 13	1XY13	31	Input 13	1X(Y+1)13
14	Input 14	1XY14	32	Input 14	1X(Y+1)14
15	Input 15	1XY15	33	Input 15	1X(Y+1)15
16	Input 16	1XY16	34	Input 16	1X(Y+1)16
17	Input 17	1XY17	35	Input 17	1X(Y+1)17
18	N.C.		36	N.C.	
			37	N.C.	

Where: X = Rack Number (1, 2, 3 ...)
Y = Module Group (0-7)

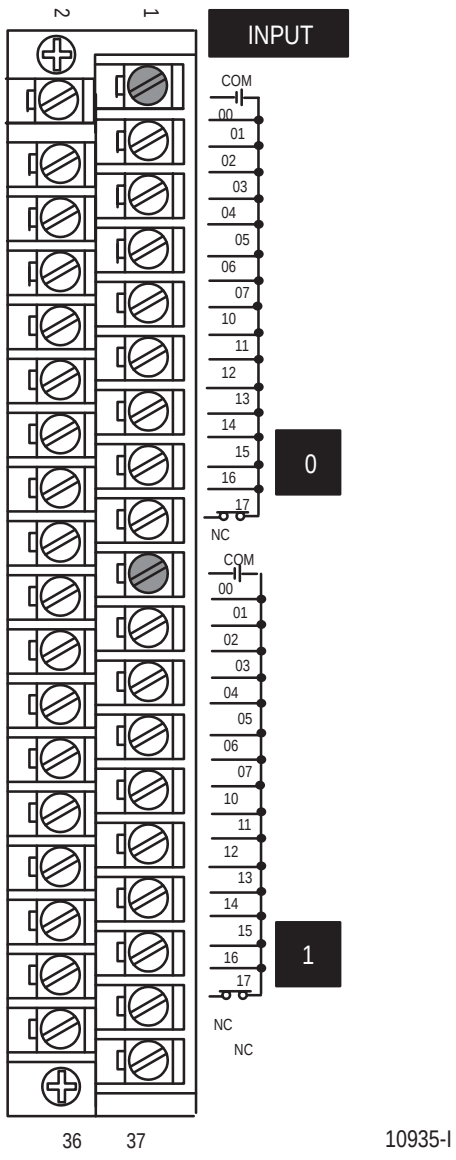

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Table 3.C
1791-IOBX Input Terminal Addressing for Groups 2 and 3 (TRM2)

Terminal Number	Input Assignment Group 2	Program Address	Terminal Number	Input Assignment Group 3	Program Address
1	Common C		19	Common D	
2	Input 00	1X(Y+2)00	20	Input 00	1X(Y+3)00
3	Input 01	1X(Y+2)01	21	Input 01	1X(Y+3)01
4	Input 02	1X(Y+2)02	22	Input 02	1X(Y+3)02
5	Input 03	1X(Y+2)03	23	Input 03	1X(Y+3)03
6	Input 04	1X(Y+2)04	24	Input 04	1X(Y+3)04
7	Input 05	1X(Y+2)05	25	Input 05	1X(Y+3)05
8	Input 06	1X(Y+2)06	26	Input 06	1X(Y+3)06
9	Input 07	1X(Y+2)07	27	Input 07	1X(Y+3)07
10	Input 10	1X(Y+2)10	28	Input 10	1X(Y+3)10
11	Input 11	1X(Y+2)11	29	Input 11	1X(Y+3)11
12	Input 12	1X(Y+2)12	30	Input 12	1X(Y+3)12
13	Input 13	1X(Y+2)13	31	Input 13	1X(Y+3)13
14	Input 14	1X(Y+2)14	32	Input 14	1X(Y+3)14
15	Input 15	1X(Y+2)15	33	Input 15	1X(Y+3)15
16	Input 16	1X(Y+2)16	34	Input 16	1X(Y+3)16
17	Input 17	1X(Y+2)17	35	Input 17	1X(Y+3)17
18	N.C.		36	N.C.	
			37	N.C.	

Where: X = Rack Number (1, 2, 3 ...)
Y = Module Group (0-7)

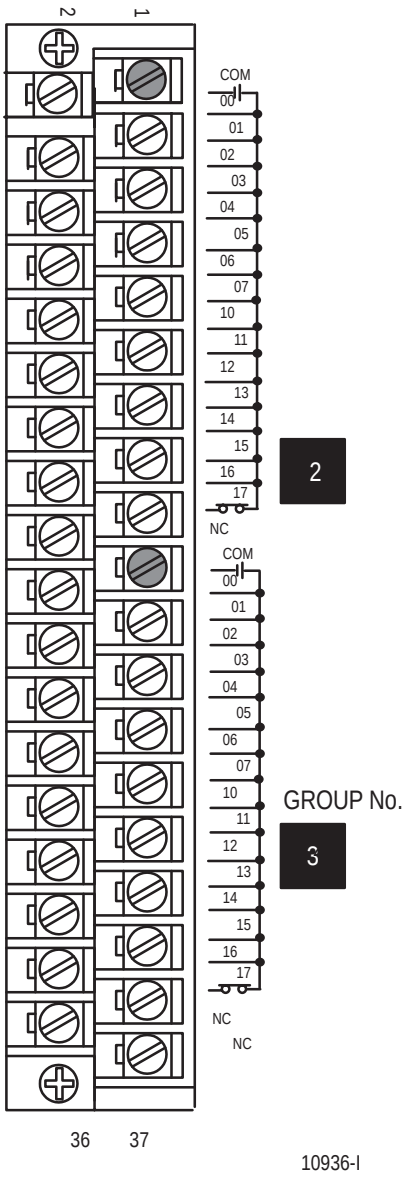

Table 3.D
1791-IOBX Output Terminal Addressing for Groups 0 and 1 (TRM3)

Terminal Number	Output Assignment Group 1	Program Address	Terminal Number	Output Assignment Group 0	Program Address
1	N.C.		20	Common A	
2	Common B		21	Output 17	0XY17
3	Output 17	0X(Y+1)17	22	Output 16	0XY16
4	Output 16	0X(Y+1)16	23	Output 15	0XY15
5	Output 15	0X(Y+1)15	24	Output 14	0XY14
6	Output 14	0X(Y+1)14	25	Output 13	0XY13
7	Output 13	0X(Y+1)13	26	Output 12	0XY12
8	Output 12	0X(Y+1)12	27	Output 11	0XY11
9	Output 11	0X(Y+1)11	28	Output 10	0XY10
10	Output 10	0X(Y+1)10	29	Output 07	0XY07
11	Output 07	0X(Y+1)07	30	Output 06	0XY06
12	Output 06	0X(Y+1)06	31	Output 05	0XY05
13	Output 05	0X(Y+1)05	32	Output 04	0XY04
14	Output 04	0X(Y+1)04	33	Output 03	0XY03
15	Output 03	0X(Y+1)03	34	Output 02	0XY02
16	Output 02	0X(Y+1)02	35	Output 01	0XY01
17	Output 01	0X(Y+1)01	36	Output 00	0XY00
18	Output 00	0X(Y+1)00	37	VDC A	
19	VDC B				

Where: X = Rack Number (1, 2, 3 ...)
Y = Module Group (0-7)

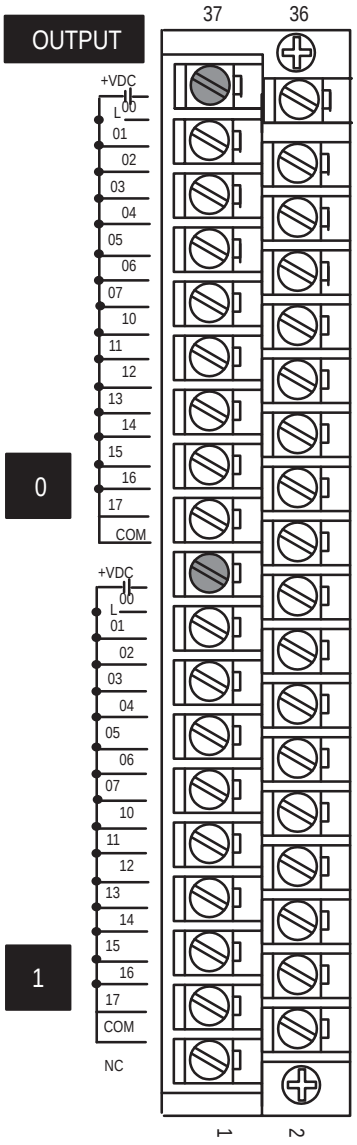

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Table 3.E
1791-IOBX Output Terminal Addressing for Groups 2 and 3 (TRM4)

Terminal Number	Output Assignment Group 3	Program Address	Terminal Number	Output Assignment Group 2	Program Address
1	N.C.		20	Common C	
2	Common D		21	Output 17	0X(Y+2)17
3	Output 17	0X(Y+3)17	22	Output 16	0X(Y+2)16
4	Output 16	0X(Y+3)16	23	Output 15	0X(Y+2)15
5	Output 15	0X(Y+3)15	24	Output 14	0X(Y+2)14
6	Output 14	0X(Y+3)14	25	Output 13	0X(Y+2)13
7	Output 13	0X(Y+3)13	26	Output 12	0X(Y+2)12
8	Output 12	0X(Y+3)12	27	Output 11	0X(Y+2)11
9	Output 11	0X(Y+3)11	28	Output 10	0X(Y+2)10
10	Output 10	0X(Y+3)10	29	Output 07	0X(Y+2)07
11	Output 07	0X(Y+3)07	30	Output 06	0X(Y+2)06
12	Output 06	0X(Y+3)06	31	Output 05	0X(Y+2)05
13	Output 05	0X(Y+3)05	32	Output 04	0X(Y+2)04
14	Output 04	0X(Y+3)04	33	Output 03	0X(Y+2)03
15	Output 03	0X(Y+3)03	34	Output 02	0X(Y+2)02
16	Output 02	0X(Y+3)02	35	Output 01	0X(Y+2)01
17	Output 01	0X(Y+3)01	36	Output 00	0X(Y+2)00
18	Output 00	0X(Y+3)00	37	VDC C	
19	VDC D				

Where: X = Rack Number (1, 2, 3 ...)
Y = Module Group (0-7)

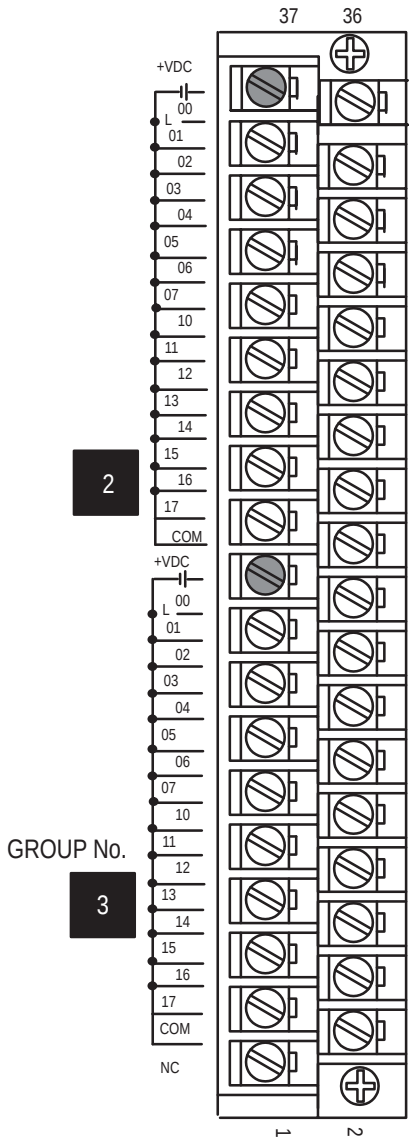

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Table 3.F
1791-IOVX Input Terminal Addressing for Groups 0 and 1 (TRM1)

Terminal Number	Input Assignment Group 0	Program Address	Terminal Number	Input Assignment Group 1	Program Address
1	VDC A		19	VDC B	
2	Input 00	1XY00	20	Input 00	1X(Y+1)00
3	Input 01	1XY01	21	Input 01	1X(Y+1)01
4	Input 02	1XY02	22	Input 02	1X(Y+1)02
5	Input 03	1XY03	23	Input 03	1X(Y+1)03
6	Input 04	1XY04	24	Input 04	1X(Y+1)04
7	Input 05	1XY05	25	Input 05	1X(Y+1)05
8	Input 06	1XY06	26	Input 06	1X(Y+1)06
9	Input 07	1XY07	27	Input 07	1X(Y+1)07
10	Input 10	1XY10	28	Input 10	1X(Y+1)10
11	Input 11	1XY11	29	Input 11	1X(Y+1)11
12	Input 12	1XY12	30	Input 12	1X(Y+1)12
13	Input 13	1XY13	31	Input 13	1X(Y+1)13
14	Input 14	1XY14	32	Input 14	1X(Y+1)14
15	Input 15	1XY15	33	Input 15	1X(Y+1)15
16	Input 16	1XY16	34	Input 16	1X(Y+1)16
17	Input 17	1XY17	35	Input 17	1X(Y+1)17
18	N.C.		36	N.C.	
			37	N.C.	

Where: X = Rack Number (1, 2, 3 ...)
Y = Module Group (0-7)

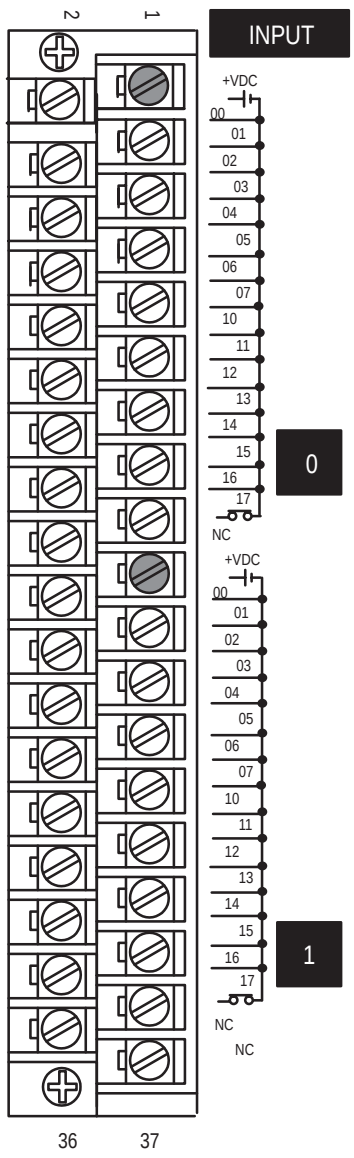

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Table 3.G
1791-IOVX Input Terminal Addressing for Groups 2 and 3 (TRM2)

Terminal Number	Input Assignment Group 2	Program Address	Terminal Number	Input Assignment Group 3	Program Address
1	VDC C		19	VDC D	
2	Input 00	1X(Y+2)00	20	Input 00	1X(Y+3)00
3	Input 01	1X(Y+2)01	21	Input 01	1X(Y+3)01
4	Input 02	1X(Y+2)02	22	Input 02	1X(Y+3)02
5	Input 03	1X(Y+2)03	23	Input 03	1X(Y+3)03
6	Input 04	1X(Y+2)04	24	Input 04	1X(Y+3)04
7	Input 05	1X(Y+2)05	25	Input 05	1X(Y+3)05
8	Input 06	1X(Y+2)06	26	Input 06	1X(Y+3)06
9	Input 07	1X(Y+2)07	27	Input 07	1X(Y+3)07
10	Input 10	1X(Y+2)10	28	Input 10	1X(Y+3)10
11	Input 11	1X(Y+2)11	29	Input 11	1X(Y+3)11
12	Input 12	1X(Y+2)12	30	Input 12	1X(Y+3)12
13	Input 13	1X(Y+2)13	31	Input 13	1X(Y+3)13
14	Input 14	1X(Y+2)14	32	Input 14	1X(Y+3)14
15	Input 15	1X(Y+2)15	33	Input 15	1X(Y+3)15
16	Input 16	1X(Y+2)16	34	Input 16	1X(Y+3)16
17	Input 17	1X(Y+2)17	35	Input 17	1X(Y+3)17
18	N.C.		36	N.C.	
			37	N.C.	

Where: X = Rack Number (1, 2, 3 ...)
Y = Module Group (0-7)

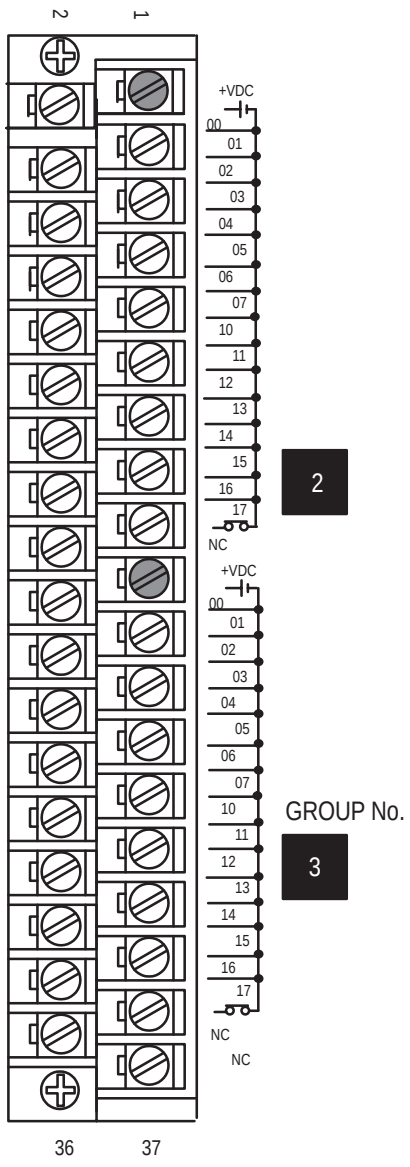

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Table 3.H
1791-IOVX Output Terminal Addressing for Groups 0 and 1 (TRM3)

Terminal Number	Output Assignment Group 1	Program Address	Terminal Number	Output Assignment Group 0	Program Address
1	N.C.		20	Common A	
2	Common B		21	Output 17	0XY17
3	Output 17	0X(Y+1)17	22	Output 16	0XY16
4	Output 16	0X(Y+1)16	23	Output 15	0XY15
5	Output 15	0X(Y+1)15	24	Output 14	0XY14
6	Output 14	0X(Y+1)14	25	Output 13	0XY13
7	Output 13	0X(Y+1)13	26	Output 12	0XY12
8	Output 12	0X(Y+1)12	27	Output 11	0XY11
9	Output 11	0X(Y+1)11	28	Output 10	0XY10
10	Output 10	0X(Y+1)10	29	Output 07	0XY07
11	Output 07	0X(Y+1)07	30	Output 06	0XY06
12	Output 06	0X(Y+1)06	31	Output 05	0XY05
13	Output 05	0X(Y+1)05	32	Output 04	0XY04
14	Output 04	0X(Y+1)04	33	Output 03	0XY03
15	Output 03	0X(Y+1)03	34	Output 02	0XY02
16	Output 02	0X(Y+1)02	35	Output 01	0XY01
17	Output 01	0X(Y+1)01	36	Output 00	0XY00
18	Output 00	0X(Y+1)00	37	VDC A	
19	VDC B				

Where: X = Rack Number (1, 2, 3 ...)
Y = Module Group (0-7)

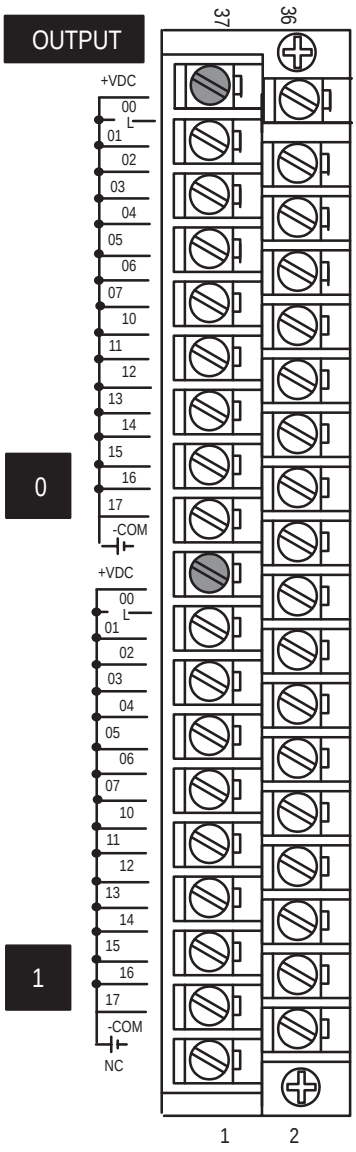

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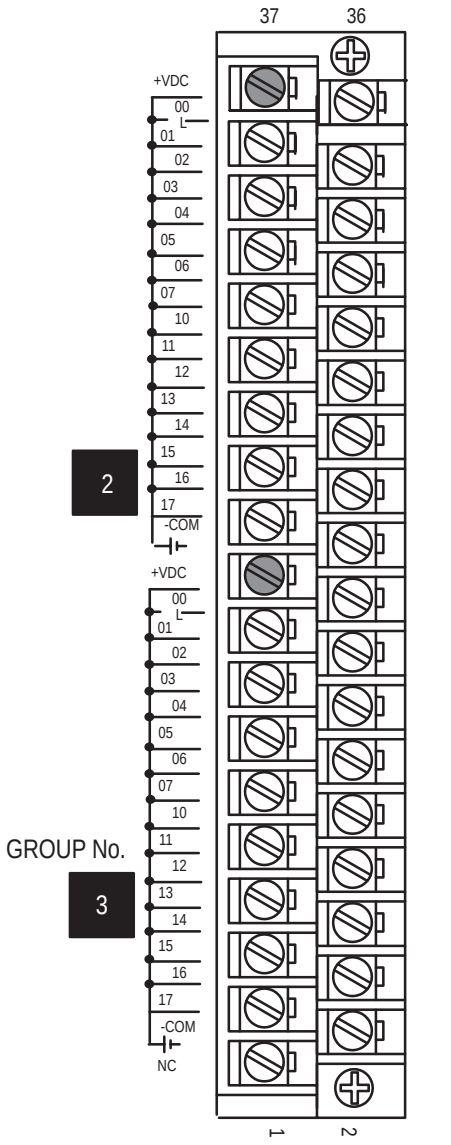
Table 3.I
1791-IOVX Output Terminal Addressing for Groups 2 and 3 (TRM4)

Terminal Number	Output Assignment Group 3	Program Address	Terminal Number	Output Assignment Group 2	Program Address
1	N.C.		20	Common C	
2	Common D		21	Output 17	0X(Y+2)17
3	Output 17	0X(Y+3)17	22	Output 16	0X(Y+2)16
4	Output 16	0X(Y+3)16	23	Output 15	0X(Y+2)15
5	Output 15	0X(Y+3)15	24	Output 14	0X(Y+2)14
6	Output 14	0X(Y+3)14	25	Output 13	0X(Y+2)13
7	Output 13	0X(Y+3)13	26	Output 12	0X(Y+2)12
8	Output 12	0X(Y+3)12	27	Output 11	0X(Y+2)11
9	Output 11	0X(Y+3)11	28	Output 10	0X(Y+2)10
10	Output 10	0X(Y+3)10	29	Output 07	0X(Y+2)07
11	Output 07	0X(Y+3)07	30	Output 06	0X(Y+2)06
12	Output 06	0X(Y+3)06	31	Output 05	0X(Y+2)05
13	Output 05	0X(Y+3)05	32	Output 04	0X(Y+2)04
14	Output 04	0X(Y+3)04	33	Output 03	0X(Y+2)03
15	Output 03	0X(Y+3)03	34	Output 02	0X(Y+2)02
16	Output 02	0X(Y+3)02	35	Output 01	0X(Y+2)01
17	Output 01	0X(Y+3)01	36	Output 00	0X(Y+2)00
18	Output 00	0X(Y+3)00	37	VDC C	
19	VDC D				

Where: X = Rack Number (1, 2, 3 ...)
Y = Module Group (0-7)



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Summary

In this chapter you learned how to set the configuration switches and the rack addresses for input and output terminals.

Chapter 4

Troubleshooting

Chapter Objectives

In this chapter you will learn about the indicators on the block I/O module, and how to use them to troubleshoot the unit.

Indicators

Each block I/O module has indicators (Figure 4.1) which provide indication of specific functions. Each module has the following:

Status Indicators - Indicators are provided for power, active, communication and fuse blown indications. An LED array provides input/output status.

- **POWER** Indicator -
  - green -on continuously if customer voltage is present; off if power is not applied or there is an internal power supply problem.
- **ACTIVE** Indicator -
  - red if the CPU is not running; green if the CPU is operating correctly.
- **COMM** Indicator - indicates the status of the RIO link.
  - green when communication is correctly established; off when communication is not established; flashing when programmable controller is in PROG mode.
- **FUSE** Indicator - indicates the status of the 4 output fuses.
  - off if all 4 fuses are intact; red if any one of the fuses opens.

The I/O status array is an 8 by 8 array of 64 LEDs capable of displaying the status of 32 inputs and 32 outputs at any one time. Pushbuttons are provided to toggle the display between the lower 32 bits and the upper 32 bits.

Refer to Table 4.A below for status indications reported by the indicators.

Figure 4.1
Indicators on the 1791-IOBX and -IOVX Block I/O Modules (PLC labels shown)

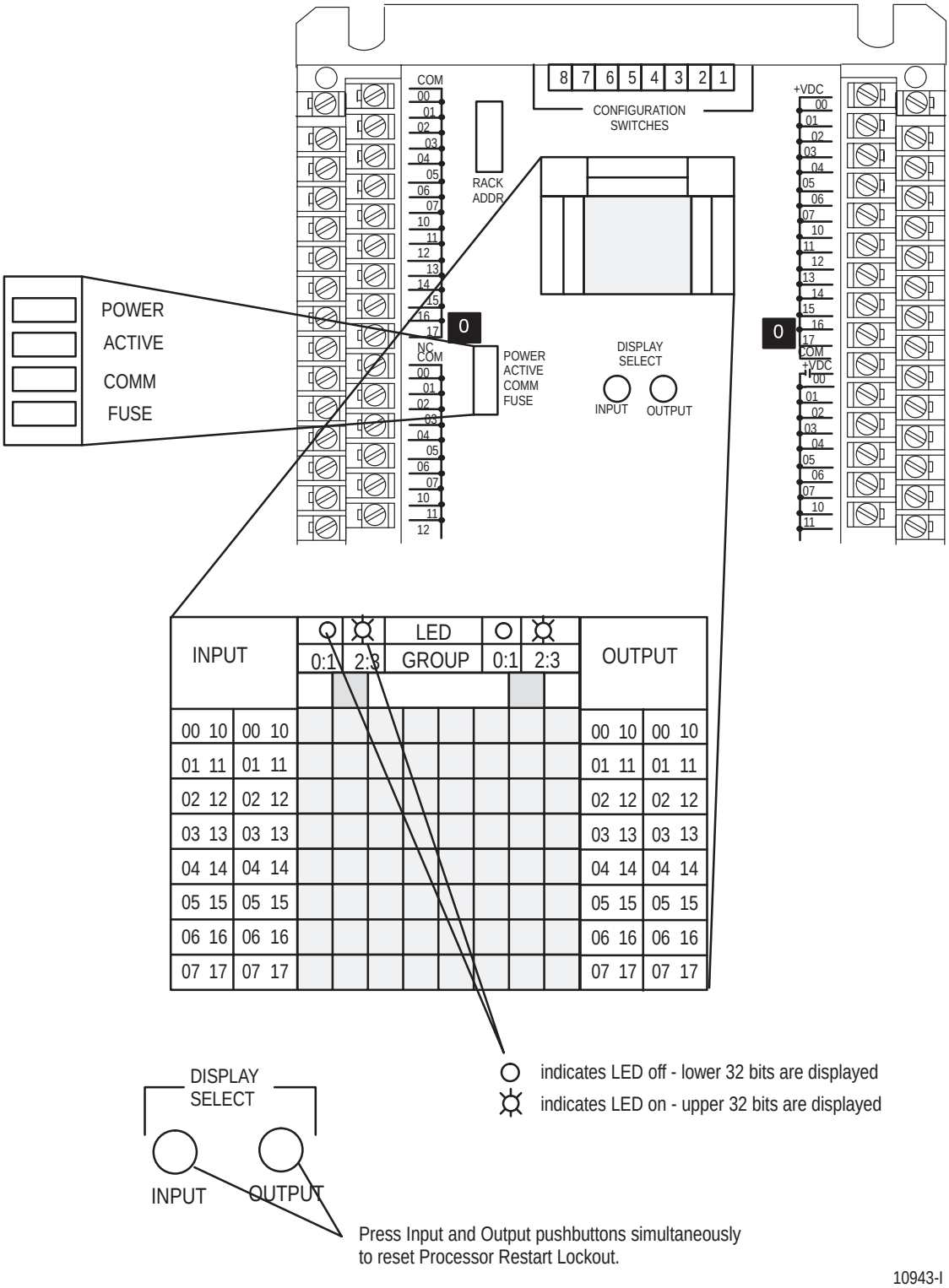

Table 4.A
Troubleshooting Chart

	Indication	Probable Cause	Corrective Action
POWER (green)	Green I/O status on/off	Normal indication	None required
	Off	No 24V dc power connected, or hardware fault.	Check 24V dc power to block
COMM (green)	Solid green	Normal indication - module is communicating with the programmable controller	None required
	Off	No communication with adapter, scanner etc.	Check that power LED is on. Make sure that proper number of blocks are configured.
	Flashing green	Reset command (or output disable bit for SLC) has been issued by processor, scanner or adapter. SLC or programmable controller not in run mode.	Check program. Correct as necessary. Place in run mode.
ACTIVE (green/red)	Green	Normal indication	None
	Red	Internal CPU fault	Return module for repair
FUSE (red)	Red	One or more fuses are open	Replace blown fuse
	Off	Normal indication	None required

Replacing a Fuse

The block I/O module has one fuse for each group of outputs. To replace a fuse, proceed as follows.

1. Remove power to the block I/O module.

ATTENTION: Remove power to the block I/O module before attempting to replace the fuse.

- Failure to remove power from the block I/O module could cause injury or equipment damage due to possible unexpected operation.
- Failure to remove power from the module could cause module damage, degradation of performance or injury.

2. Remove the 5 screws securing the cover to the block I/O module.

3. Locate and remove the blown fuse.

4. Replace the blown fuse with a 5.0A slow blow fuse.
5. Reinstall cover and secure with 5 screws removed in step 2.
6. Reapply power to the module.

Summary

In this chapter you learned what the LED indicators represent, and how to interpret them.

Appendix A

Specifications

General Specifications	
External power	Range: 18 to 26.4V dc 300mA @ 24V dc; initial surge 2.0A for 10msec
Power Dissipation	25.2 Watts (maximum); 15.2 Watts (typical)
Thermal Dissipation	86.2 BTU/hr (maximum); 51.9 BTU/hr (typical)
Remote I/O Isolation	850V dc (transformer) for 1 second
Interconnect cable length PLC or SLC	RIO: 57.6K 10,000 cable–feet 115.2K 5,000 cable–feet 230.4K 2,500 cable–feet
Cable requirements	RIO – Belden 9463
Dimensions	Inches: 6.15W x 13.0H x 1.72D Millimeters: 156.21W x 334.0H x 43.7D
Conductors Wire Size Category	14 gauge ($2mm^2$) stranded (maximum) 3/64 inch (1.2mm) insulation (maximum) 2[1]
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity Operating Non-operating	 32 to 140°F (0 to 60°C) –40 to 185°F (–40 to 85°C) 5 to 95% noncondensing 5 to 80% noncondensing

[1] Refer to publication 1770–4.1, Programmable Controller Wiring and Grounding Guidelines

Input Specifications	
Number of Inputs	64 (4 groups of 16)
Input type	1791–IOBX – Sinking; 1791–IOVX – Sourcing
On-state voltage range	12.0 to 26.4V dc
On–state input current	1.56mA (minimum)
Off–state voltage	7.0V dc (maximum)
Off–state current	1.0mA dc (maximum)
Turn On time	10msec (maximum) (±4msec)
Turn Off time	10msec (maximum) (±4msec)
Input to System Isolation	1500V ac (opto) for 1 second
Group to Group Isolation	1500V ac (air gap) for 1 second

Output Specifications	
Number of outputs	64 (4 groups of 16)
Output type	1791–IOBX – Source; 1791–IOVX – Sink
Maximum output range	18.0 to 26.4V dc @ 300mA resistive
Maximum on–state voltage drop	1.5V dc maximum @ 25^{o}C at rated current
Maximum on–state current	300mA per point (maximum)
Minimum on–state current	5mA (minimum)
Output Current per output group	2.4A maximum continuous
Surge Current	1.0A for 25ms (maximum), 1 pulse per second max.
Off–state voltage	26.4V dc (maximum)
Off–state leakage current	0.5mA (maximum)
Turn on time	2.0ms (maximum)
Turn off time	2.0ms (maximum)
Fuse Type	5.0A slow blow (5 X 20mm size) – one per group
Output to System Isolation	1500V ac (opto) for 1 second
Group to Group Isolation	1500V ac (air gap) for 1 second

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